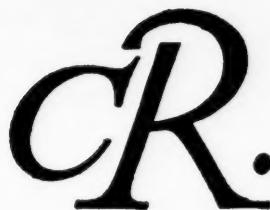


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1859: YEAR OF FULFILLMENT

Lionel Stevenson

ADDICTION TO CHRONOLOGICAL categories is inherent in the academic mind. No scholar feels entirely happy in a discussion until he has set his topic firmly in the framework of an "era" or an "epoch." These divisions are always oversimplifications, and some are almost totally fictitious; and they become all the more arbitrary if they are defined by specific dates. Nevertheless, a few of them are too useful to be discarded; and one of the most defensible is that which dates the beginning of the modern era in 1859. Major publications of that year produced radical changes in religious belief, in political theory, in scientific hypotheses, and in aesthetic practices. We are still living in the midst of the seismic dislocations that originated in that titanic year.

In English literary history, it witnessed the deaths of virtually the last survivors of the great romantic generation, Thomas de Quincey and Leigh Hunt. Only Walter Savage Landor was left to cling to life for five more years as "the last leaf on an old tree." A younger man who also died in 1859, Thomas Babington Macaulay, was the very epitome of Victorian bourgeois complacency—the last of the Whigs. After him no thinker continued to regard history and politics in terms of inevitable progress based upon material prosperity.

Born in 1859 were four men who were destined to be typical of new attitudes that dominated the last decade of the 19th century. A. E. Housman became the poetic spokesman of social disillusionment and moral despair. Francis Thompson represented the reaction toward mystical symbolism and the protective authority of the Roman Church.

Havelock Ellis fought indomitably for candid discussion of sex, whether in literature or in everyday life. And Arthur Conan Doyle gave a fresh direction to the popular novel by combining the romantic mood with scientific processes of induction.

It is amusing to glance also at the less momentous events of the year and to recognize the first symptoms of present-day phenomena. Unprecedented newspaper publicity attended Blondin's spectacular feat of crossing Niagara Falls on a tight-rope, and the emergence of our spectator sports can be perceived in the first American tour of a foreign team. English cricketers played matches in the United States and Canada in the presence of monstrous crowds: there were 10,000 spectators for their game in New York City, and at the Philadelphia match, a sports-writer reported, "one stand was occupied by over 1000 ladies, which so put off the English team that Carpenter was caught out off a wide."

To survey the incalculable effects of the 1859 books through the century that intervenes, one would have to write a history of modern culture. A more manageable task is that of observing how those epochal works came into existence. Not one of them was a sudden inspiration or a maiden performance. Their authors all went through a protracted process of trial-and-error, in which dogged persistence was diversified with what appear to be interventions of sheer chance. Only thus could the barrier of habit and tradition be penetrated and fundamentally new intellectual concepts or artistic objectives be discovered beyond.

I

Pride of place must be accorded to Charles Darwin, since *The Origin of Species* was the crucial book in precipitating the change of outlook. In some degree his preparation began two generations before his appearance, because *The Origin of Species* was preceded, seventy years earlier, by *The Loves of*

the Plants, a scientific poem written by Dr. Erasmus Darwin, a scholarly physician of Derby. The 18th century saw nothing incongruous in using heroic couplets and mythological metaphors for a treatise on biological processes. He expanded this poem into *The Botanic Garden*, and later wrote a sequel, *The Temple of Nature, or the Origin of Society*. He also presented his theories in an extensive prose work, *Zoonomia*, in which he stated a hypothesis that he had derived from Buffon, that all living creatures had developed by a process of organic change, which was caused by the actions and needs of the animals themselves.

Erasmus Darwin had been dead for seven years when his grandson Charles was born in 1809, and there is no evidence that he exerted any direct influence on Charles's thinking, though the younger man must have been familiar with his developmental concept. Just after he graduated from Cambridge, the British government commissioned the brig *Beagle* for a long map-making cruise around the world, with special attention to South America and the Pacific Islands. The commander asked the professor of botany at Cambridge to recommend a naturalist who would preserve and classify all plants and animals encountered during the voyage, and the professor put in the name of his recent pupil, who had shown an aptitude for the subject. Here we have the first instance of the fortuitous coincidences that I have already mentioned. During the five years of the voyage he became curious about the differences between plants and animals on islands and those on the nearest continent, and between living examples and fossils of extinct varieties. After his return to England his narrative of the voyage of the *Beagle* demonstrated his ability to write clear and interesting prose; but otherwise for twenty-two years after the voyage ended he printed only a few technical papers on such subjects as "volcanic islands," "the formation of mould," and "recent barnacles." When he found the key to his mystifying problems it was not in a work

of biological or physical science, but in a book on economics, the *Essay on Population*, by Thomas Robert Malthus, first published in 1798, only four years after Erasmus Darwin's *Zoonomia*. As soon as he read it, he later explained, "the idea of natural selection through the struggle for existence at once occurred to me."

Even when he had formulated his hypothesis, however, another fifteen years were spent in testing it, and he might have continued indefinitely with accumulating evidence had not chance impelled him to put it into print. When Alfred Russel Wallace, fifteen years his junior, who had been on a series of specimen-collecting expeditions not unlike the cruise of the *Beagle*, arrived independently at a theory almost identical with Darwin's, he wrote a paper about it and happened to send it to Darwin for transmission to the Linnean Society. Realizing that he was in danger of losing the credit for his lifetime of work, Darwin hastily finished his book, which was published when he was fifty years of age.

It might be assumed that this sort of interminable preparation is essential only for a major work in the natural sciences, wherein the discipline of exhaustive experiment is obligatory. But when we look at the other representative works of 1859, we find that they took almost as long in gestation.

A fantastic best-seller of the year was *Self-Help*, by Samuel Smiles, who had started life as a shopkeeper's son in Scotland and had been a medical student in Edinburgh about the same time as Darwin. He soon gave up medicine in favor of journalism, and in 1845 he became secretary to a railway company, a position that inevitably led to prosperity in the expansive years that followed. In 1845 he also began to give lectures for young men in the Mutual Improvement Societies which were a symptom of the ambitions stirring in the working class. Out of these lectures grew his book, which was rejected by publishers for a number of years. Smiles finally undertook to subsidize it, paying the publisher a ten per

cent royalty—a reversal of normal procedure that proved to be an admirable example of the principles that the book promulgated, for it is still in print in its seventy-first impression, and has been translated into seventeen languages, including Armenian and Tamil. Smiles used brief biographies of successful men, preferably engineers and inventors, though it included Shakespeare and even (amazingly) Benvenuto Cellini, to prove that thrift, honesty, and hard work are the road to success. "Help from without," he asserted, "is often enfeebling in its effects, but help from within invigorates." Though he had started his career as a political radical, he later rejected legislative panaceas as cures for social evils. By focusing his attention resolutely upon individual cases, he was able to ignore the implications of his doctrine, which actually was a kind of social Darwinism, ruthlessly predicated upon "the survival of the fittest."

These implications were honestly faced in a vastly more important book of the same year, John Stuart Mill's essay *On Liberty*. Three years older than Darwin, Mill had been subjected to a rigorous education by his father, the successor to Jeremy Bentham as leader of the philosophical radicals. He started to learn Greek at three, Latin and algebra at eight, scholastic logic at twelve, and economics the next year. By teaching his younger brothers and sisters he gained expository skill, and by perpetually debating with his father he was trained to think for himself, rejecting all authority and examining all sides of every question. At sixteen he organized several of his friends into what he named the Utilitarian Society, and soon afterwards he began to contribute to newspapers and to the *Westminster Review*.

The basic principle of Benthamism, or Utilitarianism, as Mill had renamed it, was that all ethical and social values must be determined by what conduces to "the greatest happiness of the greatest number." This was the quintessence of the humanitarianism and the belief in progress that had de-

veloped in the late 18th century; but it was typical also of the 18th century in its austere rationalism. As expounded in detail by Bentham and the Mills, it became an arid and mechanical system that depended upon the single principle that pleasure is preferable to pain and judged what was good for people solely in terms of material gratifications.

The elder Mill's inflexible rationalism had scorned all imaginative literature and had subordinated personal affections to the public good. His son inherited this inhuman set of social theories; but his temperament was not so somber, and by going through an agonizing period of self-evaluation, he succeeded in breaking the mental shackles that his father had imposed. Wordsworth's poetry, in particular, served as the catalyzing agent, much as Malthus had performed the same function for Darwin. "I never, indeed," Mill explains in his autobiography, "wavered in the conviction that happiness is the test of all rules of conduct, and the end of life. But I now thought that this end was only to be attained by not making it the direct end. Those only are happy (I thought) who have their minds fixed on some object other than their own happiness; on the happiness of others, on the improvement of mankind, even on some art or pursuit, followed not as a means, but as itself an ideal end. Aiming thus at something else, they find happiness by the way. . . . The other important change which my opinions at this time underwent was that I, for the first time, gave its proper place, among the prime necessities of human well-being, to the internal culture of the individual. I ceased to attach almost exclusive importance to the ordering of outward circumstances, and the training of the human being for speculation and for action. . . . The cultivation of the feelings became one of the cardinal points in my ethical and philosophical creed. . . . I now began to find meaning in the things which I had read or heard about the importance of poetry and art as instruments of human culture. But it was some time longer before

I began to know this by personal experience. . . . This state of my thoughts and feelings made the fact of my reading Wordsworth for the first time (in the autumn of 1828) an important event in my life. . . . What made Wordsworth's poems a medicine for my state of mind, was that they expressed not merely outward beauty, but states of feeling, and of thought coloured by feeling, under the excitement of beauty. . . . In them I seemed to draw from a source of inward joy, of sympathetic and imaginative pleasure, which could be shared in by all human beings; which had no connexion with struggle or imperfection, but would be made richer by every improvement in the physical or social condition of mankind."

Though Mill was only twenty-two when he thus discovered that sympathy and imagination were essential to social theory, another thirty years elapsed before he began to embody this perception clearly in his published writings. Nothing of it is to be seen in the two massive works that established his intellectual eminence. The *System of Logic* (1843) and *Principles of Political Economy* (1848) are so forbiddingly technical and impersonal that they cannot be counted as works of literature. The *Logic* was intended to integrate the new methods of inductive science with the old mechanism of reasoning. The *Political Economy* enunciated the principles of free trade and unrestricted competition that became the dogmas of the English Liberal party. Both books remained basic texts in their respective fields until the end of the century, and exerted an incalculable influence on the thinking of the era; but they were known at first hand only to specialists and not to the general reader.

Two decades of acute personal dilemma, however, eventually endowed Mill with a real comprehension of the principles that he had first acquired vicariously from Wordsworth's poetry. In 1831 he met Harriet Taylor, a serious-minded woman who soon separated from her husband and

devoted herself to Mill. The affection and understanding between them was respected by their friends but remained socially disreputable until Mrs. Taylor was free to marry him in 1851. Her human sympathy lent warmth to his chilly intellectualism, and their equivocal social status made him realize how inextricably ethical decisions are conditioned by personal emotions. His grief over her death in 1858 impelled him to communicate the ideas they had evolved to a wider audience than he had previously addressed.

In one hundred and fifty brief pages the essay *On Liberty* epitomized the British tradition of independence in opinion and action more effectively than anything since the *Areopagitica*; but instead of Milton's sonorous rhetoric it uses the quiet persuasiveness of logical analysis. While remaining loyal to his doctrines of *laissez-faire* and the viciousness of autocracy—whether that of an individual dictator or a prejudiced majority—Mill admitted the need for restraining the harmful effects of greedy individualism. Perhaps more than any other book, *On Liberty* propagated the concept of social responsibility in a capitalistic society that led gradually to the welfare state and the New Deal.

II

The pedigree of 1859's important poetry cannot be adorned with precise dates, but it was just as certainly the consequence of preparatory decades. Alfred Tennyson was six months younger than Darwin and they had been at Cambridge at the same time, though there is no evidence that they knew each other. Tennyson's book, published in 1859, would not now be recognized under the title that it bore when it went to the printers, *The True and the False*; at the last moment its name was changed in proof to *Idylls of the King*, a phrase implying that it was made up of four separate narratives united only by the fact that they dealt with episodes involving knights of the Round Table. Tennyson apparently thought

of them at that time primarily as studies of feminine character, for he named the four idylls for their heroines—Enid, Vivien, Elaine, and Guinevere. This indicates that he was still haunted by the theme of his *Dream of Fair Women*, written in 1832, the contrast between the patient maiden (Jephthah's daughter, Iphigenia) and the *femme fatale* (Helen, Cleopatra). This theme, which had appeared in various forms in many of his earlier poems, was neatly exemplified in the four heroines of these idylls—Enid and Elaine representing "the True," Vivien and Guinevere "the False." To this extent an illusion of thematic structure bound the four tales together. During the subsequent twenty-five years, however, Tennyson added eight further sections that made it into the twelve books of the traditional epic and supplied a new central theme, the rise and fall of King Arthur's realm.

Tennyson, however, had been fascinated by the subject since his boyhood. The 1816 edition of Malory's *Morte d'Arthur* was in his father's library, and at an early age he made several prose outlines of material from it. His first printed poem on an Arthurian theme was "The Lady of Shalott," in his 1832 volume. It was a semi-allegorical handling of the Lancelot-and-Elaine story, apparently derived less from Malory than from an Italian novella, which similarly omitted the lady's name and had used the variant form of "Astolat." By selecting a modified type of tail-rhyme Tennyson was able to produce an effect reminiscent of the metrical romances; and the decorative descriptive passages, as well as the sentimental climax, made it one of the most popular of his early poems.

About the same time, and in the same metrical form, he wrote five stanzas of "Sir Launcelot and Queen Guinevere," giving a lyrical glimpse of the two lovers out riding in the springtime woods. The stanzaic identity of these two poems suggests that Tennyson was contemplating a sequence of Arthurian tales in the manner of the poetical romances;

but, if so, he found it tedious and abandoned it, printing the "Launcelot and Guinevere" stanzas in his 1842 volume with the subtitle, "A Fragment." Another poem of 1832 or 1833, "Sir Galahad," was based on material in Books xii, xvii, and xviii of Malory and was written in a more flexible stanza pattern. In themselves, these poems might be dismissed as examples of the ransacking of historical and legendary sources that provided much of the material in Tennyson's early volumes; but a more ambitious project is indicated by the description of the death of Arthur, in epic blank verse, which Tennyson's friends heard him read as early as 1835. This was obviously a fragment, even to the extent of beginning with a conjunctive adverb; but there is no surviving evidence as to whether any more of it was written at that time.

Sometime between 1833 and 1840 he drew up a scenario for a five-act drama on the rivalry of Arthur and Mordred and the love intrigue of Lancelot and Guinevere; Tennyson's son says that this was intended for a "musical masque." By that time, however, he was more interested in contemporary topics, as represented by "Locksley Hall" and "The Gardener's Daughter." When he printed his "Morte d'Arthur" in 1842 he felt obliged to account for its fragmentary condition, and so he supplied a humorous prologue and epilogue, in conversational blank verse, describing a Christmas-eve reunion of old college friends in a country house. One of the guests, Everard Hall, is questioned about the verse-writing for which he had shown aptitude in their undergraduate days, and the host explains:

"You know . . . he burnt
His epic, his King Arthur, some twelve books"—
And then to me demanding why? "Oh, sir,
He thought that nothing new was said, or else
Something so said 'twas nothing—that a truth
Looks freshest in the fashion of the day:
God knows: he has a mint of reasons: ask.
It pleased *me* well enough." "Nay, nay," said Hall,

"Why take the style of those heroic times?
For nature brings not back the Mastodon,
Nor we those times; and why should any man
Remodel models? these twelve books of mine
Were faint Homeric echoes, nothing worth,
Mere chaff and dross, much better burnt." "But I,"
Said Francis, "pick'd the eleventh from this hearth
And have it: keep a thing, its use will come."

Everard Hall is so clearly a self-portrait that one is almost tempted to believe that the burning of the manuscript actually occurred.

During the next fifteen years Tennyson established his fame by making "truth look freshest in the fashion of the day" in *The Princess*, *In Memoriam*, and *Maud*. But the "faint Homeric echoes" would not be banished from his mind; and in 1855, after traveling in Wales and reading the *Mabinogion*, he set to work seriously on the *Idylls*. He was beginning to perceive that the traditional material of the "heroic times" could be invested with modern significance by means of symbolic implication. Spenser had set the example with his multiple allegory, and even Sir Richard Blackmore had identified his Arthur with King William III. In "The Lady of Shalott" Tennyson himself had obviously used the Arthurian episode as a medium for expressing a theory about the artist's need of emotional involvement. His retelling of the same story in the *Idylls* shows how he was now subordinating specific allegory to good story-telling which nevertheless contributed to the over-all moral significance of the whole sequence of tales. Hence *The Idylls of the King* became not only Tennyson's longest and most popular poem, and the vehicle by which King Arthur and his knights were restored to the general imagination, but also one of the most representative expressions of the Victorian anxiety about the survival of moral and spiritual values in a materialistic era.

Tennyson in 1859 was already Poet Laureate, and the

Idylls were assured of wide acclaim. The other major poem of the year came out as an anonymous thirty-four-page pamphlet, and even if the author's name had been announced it would have meant nothing to the reading public. The booklet emanated not from a reputable publishing house but from a bookseller's shop. And the contents, a translation of an eight-hundred-years-old philosophical poem in an Asiatic tongue, seemed utterly unprepossessing. No wonder *The Rubáiyát of Omar Khayyám* remained unsold on the bookseller's shelves. And yet it, like the other masterpieces of the year, was the fruition of half a century's growth.

Edward FitzGerald was four months older than Tennyson, and they became close friends as fellow-students at Cambridge. Wealthy and indolent, he retired to his family estates in Suffolk after leaving college, and devoted himself to literature and scholarship purely as a hobby. His taste ran particularly to foreign languages, and his translation of *Six Dramas of Calderon* came out in 1853. Previously he had issued two small volumes of personal reflections, *Euphranor*, "a dialogue on youth," and *Polonius*, "a collection of wise saws and modern instances," mainly translated from the classics. These works attracted no attention beyond the circle of FitzGerald's admiring friends, which included not only Tennyson but also Thackeray and Carlyle. Though he had felt some interest in Asiatic history and literature since his boyhood because of his affection for a neighbor who had served in the Indian army, his decision to study Persian did not come until 1852.

After 1845 one of his closest friends was Edward B. Cowell, a self-trained linguist, who eventually persuaded FitzGerald to join him in the study of Persian. By 1854 he was proficient enough to make a translation of Jámí's allegorical poem, *Salámán and Absál*, which was printed in a tiny edition in 1856 and was totally ignored. At this juncture Cowell made FitzGerald acquainted with a manuscript that he had found in the Bodleian Library—the quatrains of Omar Khayyám,

which FitzGerald found far more congenial than the mystical abstractions of Jâmi.

At that time Omar's poetry was virtually unknown even in his own country. The sage of Naishapur was remembered as an eminent astronomer in the great epoch of Islamic science, and his quatrains reposed in unread manuscripts in a few libraries of the Moslem world. Enjoying what he termed their "curious infidel and Epicurean" flavor, FitzGerald spent half a year in polishing his translation, and in 1858 sent thirty-five of the "less wicked" of them to *Fraser's Magazine*, but reclaimed them when they remained unprinted for a full year. He then selected seventy-five quatrains and paid for the printing of an edition of 250 copies, but made little effort toward distribution. Two years later the bookseller (who had lost a large batch of the copies while moving shop) put the remainder on sale in his penny box. Here it caught the eye of Whitley Stokes, a young Irish philologist, who bought one and was sufficiently impressed to give copies to Rossetti and other friends. Rossetti's enthusiasm spread to Swinburne, Morris, and Ruskin, and by 1862 the poem's fame was assured. Since then, it has been one of the most widely read and cherished of all English poems beyond the dimensions of the lyric.

Its incredible success cannot be attributed to scholarly curiosity about Persian culture or even to FitzGerald's poetic skill, though his temperamental affinity with Omar did inspire him to a mastery of melodious phrases and opulent images which he never approached before or afterwards. Ordinary readers responded because they found in the poem a mood which voiced their own. The English poets of the time were obsessed with reconciling faith and reason or proposing new moral codes. Swinburne's violent diatribes against Christianity were as remote from the average person's views as Tennyson's creed of intuitive faith, Browning's doctrine of love versus power, or Arnold's frustrated indecision. No

English writer could stand far enough aloof from the current turmoil to speak with the calm agnosticism and worldly resignation of the disillusioned Persian. As a scientist rebelling against religious dogmas, Omar wrote as Darwin or Huxley or Herbert Spencer might have written if the fetters of modern specialization had not withheld them from poetry. And yet, since Omar was a medieval astronomer and his theological adversaries were Moslem, his heresies did not outrage the sensibilities of respectable 19th-century believers.

III

In fiction the most important publications of 1859 were not the work of authors who had spent quite so long in preparation as Darwin and Mill, Tennyson and Fitzgerald. Among the established novelists, not one happened to produce an indubitable masterpiece in that year. *A Tale of Two Cities* had immense popular appeal but lacked the emotional and intellectual depth of *Little Dorrit* that preceded it, or of *Great Expectations* that followed. *The Virginians* displayed distressing symptoms of Thackeray's flagging energy. *The Bertrams* is run-of-the-mill Trollope. The two works that we now recognize as sharing the credit for initiating a new era in English fiction were both first novels; but this does not mean that their authors were neophytes. Both *Adam Bede* and *The Ordeal of Richard Feverel* emerged from years of personal travail and literary experiment.

The name of "George Eliot" had first appeared attached to three long short stories that came out in *Blackwood's Magazine* in 1857, and then in book form as *Scenes of Clerical Life*. Even the publisher did not know that the author was Mary Ann Evans, who had already won esteem in intellectual circles as a critic and philosophical scholar, as well as some censure from proper folk for her unconventional way of life.

A farm manager's daughter in Warwickshire, Mary Ann Evans was brought up in the triple-distilled orthodoxy of the

rural middle class, which was Tory in politics, Anglican in creed, and adamant in the belief that women had no business using their brains. Her schooling was strictly conventional, and up to the age of twenty-two she had no contact with independent ideas. Then, when she moved into Coventry with her father, they chanced to take a house close to a family of free-thinking proclivities, through whom she met Robert Owen, Ralph Waldo Emerson, and other serious intelligentsia. More significantly, her neighbors' brother-in-law, Charles Hennell, had written a book on "The Origin of Christianity," which applied rationalistic analysis to the Bible along the lines of recent German scholarship. Miss Evans promptly abandoned her religious tenets, and she was soon at work on a translation of David Friedrich Strauss's *Leben Jesu*, which was published without her name in 1846. Her ambition for a literary career, however, was thwarted by her sense of obligation to her infirm father; as long as he lived she not only remained at home to nurse him, but also kept silent about her loss of Christian faith. After his death, when she was thirty, her friends took her to the Continent; there she spent eight months alone in Geneva. After her return, John Chapman eventually persuaded her to become sub-editor of the *Westminster Review*.

Women who supported themselves and lived away from home were still regarded with some prejudice in 1851, and the literary profession was particularly suspect. It took courage for a spinster to break away from a sheltered family life and undertake an independent career. Even more remarkable was the fact that the plain, sickly, self-educated provincial woman was accepted on equal footing by some of the most eminent thinkers of the day, such as Carlyle and Herbert Spencer. Spencer was at this time beginning his life work of synthesizing all the sciences and laying philosophical foundations for the theory of evolution. He had published *Social Statistics* in 1850 and his *Principles of Psychology* was to fol-

low in 1855. Miss Evans was profoundly impressed by his application of scientific methods to the study of human behavior and by his reasoned exposition that the principle of progress was the basic law of the universe.

Through John Chapman she met George Henry Lewes, a less exhaustive and more versatile writer. He had published several novels and was probably the best dramatic critic of the time; but his interest was now turning toward biological and psychological research. Also he was a disciple of Auguste Comte, and his *History of Philosophy* persuasively presented the doctrines of positivism. Miss Evans was immediately converted to this "religion of humanity," which filled the void that had been left by her relinquishing of Christian dogma.

Lewes was undergoing a domestic crisis: his wife had deserted him, leaving him with three young sons, and Miss Evans became, in everything but a legal sense, a wife to Lewes and a mother to his boys. This was the last of a series of major ethical decisions that she had faced. First was her break with the religious faith in which she grew up and which she still respected; next came her submission to duty in the years of her father's illness; this final dilemma was more painful because it entailed estrangement from her beloved brother.

As the preparation of a novelist, these emotional crises had given her a comprehension of the conflicts that can occur in seemingly placid lives. But this was not her only qualification. During her first twenty years she had known English rural life more intimately than any author since Bunyan; yet her later cosmopolitan experience enabled her to look back on it with a wide perspective. Her philosophical studies and her friendship with analytical thinkers had taught her to regard human behavior in terms of general social and psychological principles. Finally, as a literary critic she had formulated positive opinions about the art of fiction; one of her

last contributions to the *Westminster Review*, before writing *Scenes of Clerical Life*, was a trenchant attack on "Silly Novels by Lady Novelists," condemning their trite language, their snobbish attitudes, their slipshod methods and pretentious ignorance.

Nevertheless, she had never thought seriously of writing fiction herself until Lewes became so charmed with the humor and sympathy with which she narrated recollections of her girlhood that he encouraged her to recast them in fictional form. After the success of her three stories in *Blackwood's*, she felt confident enough to attempt the larger canvas of a novel, and *Adam Bede* was published in her fortieth year. Though it was apparently nothing more than a quiet story of country folk, readers recognized that somehow it was essentially a new sort of novel. George Eliot was a devoted admirer of Wordsworth, and shared his conviction that in "humble and rustic life . . . our elementary feelings co-exist in a state of greater simplicity, and, consequently, may be more accurately contemplated, and more forcibly communicated." Like Mill, she had learned from Wordsworth the value of human sympathy; and the abiding value of her novel resides in the author's attitude of tolerant understanding. *Adam Bede* is a sort of fictional counterpart of Mill's essay *On Liberty* in its scrupulous respect for individuality and its corollary that every individual must accept the responsibility for his actions. George Eliot's contact with the newly developing science of psychology impelled her to analyze the inward processes of thought and feeling and to let the action of the story emerge from the innate traits of the characters instead of imposing an arbitrary plot upon them.

Ever since Jane Austen and Walter Scott rescued the novel from the morass of sentiment and melodrama in which it was weltering at the beginning of the 19th century, it had been improving in psychological truth and in technical skill; but not until 1859 did any author come to the writing of

fiction with the mature wisdom and the literary integrity that rendered it an adequate vehicle for the modern scientific interpretation of human behavior.

The full range of experience is too wide, however, to be encompassed in the perceptions of a single author. The other new novelist of 1859 was equally dedicated to the search for truth and to the maintenance of the most rigorous literary standards; but his personality and his subject-matter were so utterly unlike hers that he may be considered as establishing the other pole of the axis on which the novel was thenceforward to rotate. George Eliot was an earnest moralist, George Meredith was a sophisticated wit; George Eliot's style was soberly expository, Meredith's was capricious and ornate; *Adam Bede* dealt with stolid rustics, *The Ordeal of Richard Feverel* with elegant aristocrats. Yet Meredith was just as resolutely dedicated to the ideal of shaping the novel into a fitting medium for the best thought of his era.

Eight years younger than George Eliot, he was the son of a tailor in Portsmouth, who failed in business when the boy was ten, and subsequently emigrated to South Africa, leaving George behind to pick up a somewhat haphazard education. While articled to a London attorney, young Meredith formed the ambition to be a poet, and it was partly his compulsive fascination with literature that led him, at the age of twenty-one, to marry the widowed daughter of the Thomas Love Peacock who had been a friend of Shelley and had written *Headlong Hall*, the first of his satirical and almost plotless novels, as early as 1815. Meredith's first volume of poems, in 1851, was largely in the manner of Tennyson, though it contained several pastorals that depicted nature with imaginative freshness. After several years of stubborn effort to earn a living by poetry, Meredith turned reluctantly to prose, but without abating his determination to display his originality and verbal dexterity. In *The Shaving of Shagpat* he created a fantasy based on *The Arabian Nights* but intermixed with

farce, satire, and elusive allegory. This was followed by another piece of ingenious imitation, *Farina*, derived from the folk legends of the Rhineland, where Meredith had attended school. In these two books the combining of serious symbolism with a frivolous burlesque of traditional tales followed a precedent set by Peacock in his *Maid Marian* and *The Misfortunes of Elphin*.

By this time Meredith's marriage had broken up under the stresses of poverty and incompatible temperaments, and his wife had gone off with a young painter. Thus brought face to face with a crucial problem in human relationships, Meredith attempted to investigate the causes of his marital disaster under the guise of a novel, linking it with the equally complex difficulties of father-son adjustments which harked back to the previous family crisis in his childhood. For his technique in presenting this intimately personal story he turned again to the work of his father-in-law, but this time to Peacock's "country-house" novels, *Melincourt* and *Crotchet Castle*. Meredith, however, vastly elaborated his models: Peacock's books had been brief and discursive, with characters that were two-dimensional caricatures serving merely as mouthpieces for divergent opinions. In Meredith's hands they were transformed into complex human beings, suffering agonies of self-torment and self-deception under the glittering surface of their urbane charm.

George Eliot strove to achieve the illusion of impartiality by sympathizing with all her characters, Meredith by laughing at all of them. Neither attitude could be sustained consistently throughout a novel, but both authors equally established a liaison between prose fiction and the scientific outlook by insisting on the unreasonableness of labeling characters as heroes and villains and of applying inflexible standards of right and wrong instead of analyzing each specific situation in terms of motive and environment. Meredith came particularly close to the biologists' point of view by as-

serting that the good life can be attained only by submission to the laws of nature.

If we care to apply biological principles to literary history we can see the great books of 1859 as constituting a triumphant demonstration of the Darwinian hypothesis. Each of them emerged from a long developmental process through the inexorable principle of the survival of the fittest. The elements of heredity and environment are obvious in the literary antecedents of these ultimate masterworks. Erasmus Darwin and Jeremy Bentham, Malthus and Wordsworth, Strauss and Peacock, are among the dinosaurs and pithecanthropi that necessarily preceded the more complex and better adapted organisms of 1859. And just as in physical evolution, the natural selection of the survivors was largely determined by chance. Charles Darwin's nomination as naturalist on the *Beagle*, Mill's friendship with Mrs Taylor and FitzGerald's with Edward Cowell, the emotional and ethical crises in the domestic histories of Mary Ann Evans and George Meredith—all these accidents played an integral part in the interplay of forces producing half-a-dozen great books that jointly formulated the ideas of a new era.

AN INDIAN PERSPECTIVE OF DARWIN

J. B. S. Haldane

IT IS PROBABLY too early to assess Darwin's significance for human culture. It is, however, much easier to do so if one has the stereoscopic view afforded by a measure of intimacy with more than one of the main cultures of our planet. I could not have written this article before I became an Indian. To Europeans and Americans, it inevitably seems that Darwin's greatest achievement has been to convince educated men and women that biological evolution is a fact, that living plant and animal species are all descended from ancestral species very unlike themselves, and, in particular, that men are descended from animals. This was an important event in the intellectual life of Europe, because Christian theologians had drawn a sharp distinction between men and other living beings. In view of Jesus' remarks about sheep, sparrows, and lilies, this sharp distinction may well be a perversion of the essence of Christianity. St. Francis seems to have thought so.

But in India and China this distinction has not been made; and, according to Hindu, Buddhist, and Jaina ethics, animals have rights and duties. My wife has stated categorically that Darwin converted Europe to Hinduism. This is, I think, an exaggeration, but is nearer to the truth than it sounds. Hinduism is not a religion as this term is understood by the adherents of proselytizing religions. It is an attitude toward the universe compatible with a variety of religious and philosophical beliefs.

Such attitudes are best shown in imaginative writing and art. In one of the two great epics of ancient India, the *Ramayana*, the divine hero, Ram, is aided to regain his wife, Sita,

who has been abducted by the ogre, Ravan, by an army of monkeys and bears, acting on information received from vultures. In a relief at Mahabalipuram depicting scenes from the life of Krisna, which is one of the masterpieces of medieval Indian art, the whole background consists of cows' heads. For every Hindu, the setting of human experience is alive. Of course, he does not live up to his attitudes and beliefs. Nor do Christians. If even fifty per cent of Christians forgave their debtors, from the boss who owes a week's wages to the farmer who has mortgaged his means of livelihood, the economic fabric of Christian civilization would collapse in eight hours. Similarly, many, perhaps most, Indians are cruel to animals; but kindness to animals, including vegetarianism, is commoner in India than forgiveness of debtors is in Christendom.

If Darwin had died young, Wallace would presumably have promulgated the theory of evolution by natural selection when he did, and it would probably have been accepted, though, since Wallace's arguments covered a smaller field than Darwin's, the acceptance might have been slower. And since Wallace left loopholes open for supernatural intervention, which Darwin did not, the immediate effect on Western thought might have been less.

In my opinion, however, Darwin's most original contribution to biology is not the theory of evolution but his great series of books on experimental botany published in the latter part of his life. They are concerned with those aspects of plant life which are most like animal and human life. Two are devoted to climbing plants and insectivorous plants respectively, and three to sexuality in plants, particularly those aspects which are most human, such as the evil effects of incest (the theme of *Oedipus* and *The Cenci*) and the strange devices by which its most extreme form, self-fertilization, is avoided. The facts discovered are momentous. Among their applications are the discovery of plant hormones and the in-

vention of the weed killers which resemble them chemically, and the systematic outbreeding of maize, of whose importance for the agriculture of the United States I need not write.

But what was the attitude which led to these discoveries? To answer this question, we must read not only Darwin's books, but his autobiography, and the memoir by his son, Francis. Perhaps the most enlightening passage is Francis' account of what his father called "a fool's experiment." Francis was ordered to play the bassoon to some seedlings. In fact, this did not influence their growth, as vibration of the table had done. However, other fool's experiments came off. Perhaps Darwin's classical fool's experiment was to cut a number of scalene triangles of paper, leave them on his lawn, and find that the earthworms which used some of them to plug their holes generally chose the most acute angle to drag as far as possible down the hole. Darwin did not draw a sharp line between earthworms and the old gentleman who had failed to interest him in mathematics at Cambridge.

Here are some passages from Francis' account of his father's attitude to plants: "I used to like to hear him admire the beauty of a flower; it was a kind of gratitude to the flower itself, and a personal love for its delicate form and colour. I seem to remember him gently touching a flower he delighted in; it was the same simple admiration that a child might have. He could not help personifying natural things. This feeling came out in abuse as well as praise—e.g., of some seedlings—'The little beggars are doing just what I don't want them to.' His emotional attitude to animals was one of profound aesthetic admiration. One of his favorite words was 'wonderful.' Here is a typical passage concerning the second stage larvae of barnacles. 'They have six pairs of beautifully constructed natatory legs, a pair of magnificent compound eyes, and extremely complex antennae; but they have a closed and imperfect mouth, and cannot feed'."

In India we expect and find this attitude in saints. But it

does not issue, as in Darwin's case, in increased knowledge. The usual effect is a flood of sympathy with animal and human suffering which affects a few thousand people and then degenerates into a new set of ritual prohibitions. It led Darwin to observe the objects of his love with great accuracy. Darwin, then, from the Hindu angle, had at least some of the attributes of a saint.

In fact, the movement of art in the last century has been away from Darwin, not only in Europe and North America, but in other countries strongly influenced by them. We are less interested in the details of natural objects than were our grandparents. I expect this is a mere symptom of the senility of "western" culture. I do not expect any cultural renaissance until scientific research is an honored and powerful occupation. When scientists, and particularly biologists, can influence taste, I think the program for visual art will be "Back to Albrecht Dürer."

Even before this, I venture to hope that Darwinism may be starting to affect our logic. We do not always realize how much of our ordinary thought is due to Aristotle's difficulties in classifying animals, and to the methods of classifying them which he finally adopted. The greatest Christian theologians, including St. Thomas Aquinas and Calvin, adopted Aristotle's logic, though not his metaphysics.

Aristotle's logic is based on similarities. Darwin, in the last chapter of *The Origin of the Species*, foreshadowed a logic based on differences. I quote two sentences only: "Systematists will have only to decide (not that this will be easy) whether any form be sufficiently constant and distinct from other forms, to be capable of definition, and if definable, whether the difference be sufficiently important to deserve a specific name." "Hence, without rejecting the consideration of the present existence of intermediate gradations between any two forms, we shall be led to weigh more carefully and to value higher the actual amount of difference between them."

We can now see that this last sentence was the program for a whole branch of statistics. Today we can answer two questions which could not be answered in Darwin's time. First, "Does population A of animals, plants, or men differ significantly from population B, or could the observed difference be due to random sampling from the same larger population?" Second, "Does population C differ more or less from population A than from population B?" What is perhaps of most significance is that the statistical methods devised by Gossett, Pearson, Mahalanobis, and others to answer these questions as to biological data are now becoming important in physics, geology, and other sciences. Many scientists think that all the sciences will become statistical. If so, Darwin will be recognized as a pioneer in this development.

In the field of ethics, Darwinism has probably so far been responsible for more harm than good, as a result of gross misrepresentation, for which, however, he himself bears some responsibility. Darwin was led to the theory of natural selection by reading Malthus. But natural selection still operates in a population so fortunate that there is room for every member of it. For example, the human population of North America has been increasing steadily since 1700 A.D. or earlier, and for two centuries land was available on the open frontier. However, some of the inhabitants in 1700 left many more descendants than others. There was selection for fertility, resistance to disease, and other characteristics. The population of France has been nearly stationary for sixty years, but not through famine or pestilence. However, natural selection occurs within it.

Again, Darwin naturally concentrated on obviously adaptive characters, such as teeth, horns, and the like, which are of value in the struggle between predator and prey, or between competing males. Their value is more obvious than, say, that of the production of granulocytes, which are needed to resist many infections. However, natural selection is far

more efficient in eliminating human babies without granulocytes (a recessive character), all of whom die in their first year, than wild mammals whose black color renders them conspicuous to enemies.

In consequence, although he repeatedly pointed out the importance of physiological adaptation, he certainly left the impression that the struggle for life was analogous to war and economic competition in the human species. And Darwinism was used to justify such activities. The persons who did so were presumably aware of Jesus' statement, "Blessed are the meek, for they shall inherit the earth." They were not aware that this statement is substantially true, both in human and evolutionary history. Centripetal selection is normal. That is to say, extremes leave fewer offspring than animals or plants near the average. This appears to be so even if selection occurs fairly rapidly. Giant species appear to be much less likely than those of moderate size to leave descendants.

It is a commonplace of human history that ruling classes die out. They may be massacred, but infertility seems a commoner fate. Fisher has argued cogently that the practice of marrying heiresses (who must be members of small families) has concentrated genes for infertility among ruling classes. Kinsey reported sexual behavior making for low fertility among the richer and better educated Americans. Whatever the reasons, economic success is usually correlated with biological failure. The American Negroes offer a conspicuous example of the truth of Jesus' statement. An appreciable fraction of West Africans was sufficiently meek to be capable of living as slaves, which members of prouder races were not. In consequence, their descendants are now in a majority in several regions of the American continent and its neighboring islands.

If this fact of the survival of the meek is ever realized, the consequences may be surprising. I cannot myself foresee

them. For the meek do not want to inherit the earth. I have been studying the theory of evolution fairly intensively for some forty years, and I am convinced that, given the facts of genetics, natural selection can be relied on to produce unexpected results.

To sum up, Darwin was too great a man to assess just yet. In each succeeding generation, new aspects of his work appear important. Those which I have emphasized may appear less important fifty years hence. But perhaps the perspective of Darwin from an Indian point of view may be a corrective to the "western" and Soviet perspectives.

DARWIN THE DRAMATIST

Stanley Edgar Hyman

The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life appeared in 1859, and immediately caught the imagination of the world. The first edition sold out on the day of publication, and the second shortly after. Within a few years most of the thinking world was convinced of the evolution of species, as it had not been by Buffon, Lamarck, Darwin's grandfather Erasmus, Robert Chambers' *Vestiges of Creation*, or anyone else. It has rarely been doubted that this enormous effect was achieved by the power of scientific argument, that is, by the book's rhetorical organization. This was certainly Darwin's view. He begins the book's final chapter: "As this whole volume is one long argument." One of Darwin's latest biographers, Sir Arthur Keith, in *Darwin Revalued*, best states the prevailing view: "In the *Origin* he had assembled such a solid mass of observation" that conviction followed inescapably.

There can be no doubt that the book's rhetorical effectiveness is great. Darwin states his theories simply and plausibly, bolsters them with a great deal of convincing evidence (beginning close to home with domestic animals) and scrupulously notes the difficulties and puzzles remaining. Yet the problem remains. The evidence to establish the idea of evolution by natural selection inductively was not really available in 1859, and many of Darwin's processes turn out on closer examination to be plausible hypotheses, and his causes tautologies. Nor does the vehemence of the reaction pro and con suggest the characteristic effect of a scientific demonstration.

I

I would submit that *The Origin of Species* caught the imagination of its time as a dramatic poem, and a dramatic poem of a very special sort. This view would certainly have surprised Darwin. He was under no illusions about his literary powers, and although he worked quite hard at the writing and rewriting of this book, he saw its prose as "incredibly bad." His effort was to produce the straightest possible piece of factual writing, and he was only dissuaded by the publisher, John Murray, from calling the book *An Abstract of an Essay on the Origin of Species*. It is the judgment of a popular textbook that Darwin's work "cannot be said to belong to literature, if in the definition of literary work is presupposed an effort toward artistic expression."

Theodore Baird, whose "Darwin and the Tangled Bank" is one of the few efforts I know to correct this conventional estimate, boldly claims that the *Origin* is not only a work of literature, but "the complicated literary expression known as tragedy." It is here that any literary consideration should begin. The *Origin* is much less overtly dramatistic than the *Journal of Researches*, with the act-scene fitnesses of the earlier book here confined mostly to the great historical pageant of palaeontology, as when Darwin notes that the geological strata mark "only an occasional scene, taken almost at hazard, in an ever slowly changing drama."

The key term in the *Origin* is "the struggle for existence." Darwin explains:

In looking at Nature, it is most necessary to keep the foregoing considerations always in mind—never to forget that every single organic being may be said to be striving to the utmost to increase in numbers; that each lives by a struggle at some period of its life; that heavy destruction inevitably falls either on the young or old, during each generation or at recurrent intervals.

All through the book, he refers to "a constant struggle going

on," "the constantly-recurring Struggle for Existence," "victory in the battle for life," and so on. From this struggle comes "natural selection," or, in Herbert Spencer's more vivid phrase that Darwin adopted, "the survival of the fittest."

Darwin was quite aware that all these terms were metaphoric, a heightening of much less dramatic processes. He writes of "struggle for existence":

I should premise that I use this term in a large and metaphorical sense including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny. Two canine animals, in a time of dearth, may be truly said to struggle with each other which shall get food and live. But a plant on the edge of a desert is said to struggle for life against the drought, though more properly it should be said to be dependent on the moisture. A plant which annually produces a thousand seeds, of which only one of an average comes to maturity, may be more truly said to struggle with the plants of the same and other kinds which already clothe the ground. The mistletoe is dependent on the apple and a few other trees, but can only in a far-fetched sense be said to struggle with these trees, for, if too many of these parasites grow on the same tree, it languishes and dies. But several seedling mistletoes, growing close together on the same branch, may more truly be said to struggle with each other. As the mistletoe is disseminated by birds, its existence depends on them; and it may methodically be said to struggle with other fruit-bearing plants, in tempting the birds to devour and thus disseminate its seeds. In these several senses, which pass into each other, I use for convenience' sake the general term of Struggle for Existence.

He writes similarly of "natural selection":

In the literal sense of the word, no doubt, natural selection is a false term; but who ever objected to chemists speaking of the elective affinities of the various elements?—and yet an acid cannot strictly be said to elect the base with which it in preference combines. It has been said that I speak of natural selection as an active power or Deity; but who objects to an author speaking of the attraction of gravity as ruling the movements

of the planets? Every one knows what is meant and is implied by such metaphorical expressions; and they are almost necessary for brevity.

In fact, these terms are much more than metaphors. They people the world of nature with protagonists and antagonists where previously we had seen only a solitary cactus or a growing seed. Moreover, the dramatic action they summon up is tragic. In Gilbert Murray's terms, the basic ritual stages of tragedy are *agon* or contest, *sparagmos* or tearing apart, then *anagnorisis* or discovery and *epiphany* or joyous showing-forth of the resurrected protagonist. Darwin's struggle for existence is clearly Murray's *agon* and *sparagmos*, and his natural selection or survival of the fittest, *anagnorisis* and *epiphany*. For the final exultation that the Greeks felt at the affirmation of Reliving Dionysus, Darwin substitutes a quieter tragic satisfaction. He writes: "When we reflect on this struggle, we may console ourselves with the full belief, that the war of nature is not incessant, that no fear is felt, that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply."

The *Origin* concludes: "Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life...."

We realize that this dramatic and tragic vision of life comes from Darwin, rather than from his subject matter, when we see how undramatic most contemporary formulations of natural selection are. A typical one is that of George Gaylord Simpson in *The Meaning of Evolution* in 1949: "In the modern theory natural selection is differential reproduction, plus the complex interplay in such reproduction of heredity, genetic variation, and all the other factors that affect selection and determine its results." Darwin was aware of differential reproduction as early as his draft for the *Origin*

in 1844, but always within a larger context of struggle: a fleeter fox would survive better and "rear more young," but "the less fleet ones would be rigidly destroyed."

The archetypal image of the *Origin* is the war of nature, an image Darwin at first believed he had borrowed from Alphonse de Candolle. The 1842 outline for the book begins the section on "Natural Selection": "De Candolle's war of nature.—seeing contented face of nature,—may be well at first doubted."

These notes are amplified in the 1844 essay into: "De Candolle, in an eloquent passage, has declared that all nature is at war, one organism with another, or with external nature. Seeing the contented face of nature, this may at first be well doubted; but reflection will inevitably prove it is too true."

When Darwin had to choose a few pages from his manuscript to accompany Wallace's paper in the historic presentation of the new theory to the Linnean Society in 1858, he began with that passage which he clearly recognized as the heart of his message. By the time the passage appeared in the *Origin* the next year, Darwin had recognized that De Candolle had no patent on the war of nature, and lumped him in with others. The important thing now was tearing off the pacific mask that life wears, and Darwin writes of the illusion concealing the tragic reality like a Melville narrator:

We behold the face of nature bright with gladness, we often see superabundance of food; we do not see or we forget, that the birds which are idly singing round us mostly live on insects or seeds, and are thus constantly destroying life; or we forget how largely these songsters, or their eggs, or their nestlings, are destroyed by birds and beasts of prey; we do not always bear in mind, that, though food may be now superabundant, it is not so at all seasons of each recurring year.

The flatness at the end is almost deliberate; Darwin's vision is tragic, but it is not hysterical. It never rises in pitch to melodrama, as in the "Nature, red in tooth and claw" of

Tennyson's "In Memoriam," or the Grand Guignol vision of some of Darwin's followers. After millions of years of evolution, Romanes writes typically in 1892:

We find that more than half of the species which have survived the ceaseless struggle are parasitic in their habits, lower and insentient forms of life feasting on higher and sentient forms; we find teeth and talons whetted for slaughter, hooks and suckers moulded for torment—everywhere a reign of terror, hunger, and sickness, with oozing blood and quivering limbs, with gasping breath and eyes of innocence that dimly close in deaths of brutal torture!

Darwin is aware of the tragic ambivalence of life and death, that for five thousand years "pigeons have been watched and tended with the utmost care, and loved by many people," and for just as long have been as considerably raised and tended for the pot. In the *Journal of Researches*, Darwin was moved to horror and revulsion by the fact that the natives of Tierra del Fuego, in times of hunger, kill and eat the old women of the tribe sooner than their dogs, because "Doggies catch otters, old women no." By the time of the *Origin*, this is accepted with calm objectivity:

We see the value set on animals even by the barbarians of Tierra del Fuego, by their killing and devouring their old women, in times of dearth, as of less value than their dogs.

II

When the *Origin* appeared, it was reviewed in the *American Journal of Science and Arts* by Asa Gray, perhaps the shrewdest (as Huxley was the most brilliant) of the Darwinians. Gray noted that Darwin's frankness about objections and unsolved problems gave the book the character of a mythic quest. He writes: "The interest for the general reader heightens as the author advances on his perilous way and grapples manfully with the most formidable difficulties." In the *Origin*, Darwin

tends to make the imperilled knight not himself but his theory: a difficulty would be "fatal to the whole theory," an argument is "a fatal objection," "Such objections as the above would be fatal to my views," and so on endlessly. But Darwin's imagery in correspondence makes it clear that the life at stake is Darwin's own. Sending an advance copy of the book to Hugh Falconer in 1859, he wrote: "Lord, how savage you will be if you read it, and how you will long to crucify me alive!" He wrote to H. G. Bronn in 1860: "The objections and difficulties which may be urged against my view are indeed heavy enough almost to break my back, but it is not yet broken!" When Lyell refused to come out in support of the theory publicly, Darwin wrote to him: "You cut my throat, and your own throat; and I believe will live to be sorry for it." In later years Darwin's correspondence is full of "It is clear to me that I ought to be exterminated," "I know well that I deserve many a good slap on the face," "If I am wrong, the sooner I am knocked on the head and annihilated so much the better." He seems to have seen himself as the scapegoat, the sacrificial victim, sometimes the Judaeo-Christian blameless victim without blemish, but sometimes the guilty pagan slayer who must himself be slain. When the theory of evolution first took publishable form, in 1844, Darwin wrote to Hooker "I am almost convinced (quite contrary to the opinion that I started with) that species are not (it is like confessing a murder) immutable."

If Darwin's tragic vision embraced bloodshed and murder, it also embraced beauty and joy. The *Origin* is as full of the word "beauty" as the *Journal of Researches*, but now it is a utilitarian beauty. Sometimes it is a "beautiful adaptation" to function, like that of the woodpecker, the mistletoe, or the giraffe; sometimes it has a visual loveliness too, as in "the beautifully plumed seed of the dandelion"; sometimes it is an abstraction, like the power engaged "in slowly and beautifully adapting each form to the most complex relations of

life"; sometimes it is pure exultant generalization, "there is so much beauty throughout nature." The last sentence of the book, beginning "There is grandeur in this view of life," concludes "from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved." The "wonderful" means, of course, "wonderfully adapted to survive." In 1863, Darwin wrote to Huxley: "With a book, as with a fine day, one likes it to end with a glorious sunset."

The *Origin*, although it resolutely postpones consideration of human origins for a later work, is oddly anthropocentric. One reason is that Darwin constantly humanizes animals in what used to be called the "pathetic fallacy": male alligators have courtship rites "like Indians in a war dance"; frightened ants "took heart" and a single ant stood "an image of despair over its ravaged home"; in the consolatory statement quoted above, the surviving animals are not only vigorous and healthy, but "happy." Man is always on Darwin's mind as he talks of the lower orders. The criteria for an "advance in organization" among the vertebrata are "the degree of intellect and an approach in structure to man." When the *Origin* announces the descent of man, he is not named, simply lumped in: "According to this view it may be inferred that all vertebrate animals with true lungs are descended by ordinary generation from an ancient and unknown prototype, which was furnished with a floating apparatus or swimbladder." Later in the *Origin* Darwin concludes in more detail that the higher vertebrates "are the modified descendants of some ancient progenitor, which was furnished in its adult state with branchiae, a swim-bladder, four fin-like limbs, and a long tail, all fitted for an aquatic life." (More explicitly, Darwin wrote to Lyell in 1860: "Our ancestor was an animal which breathed water, had a swim bladder, a great swimming tail, an imperfect skull, and undoubtedly was an hermaphrodite! Here is a pleasant genealogy for mankind.")

III

The chief thematic metaphor in *The Origin of Species*, constituting the book's principal imaginative design, is a visual figure that develops in richness and complexity as it goes through a series of metamorphoses. It begins as the ladderlike polity of life, a form of the medieval Great Chain of Being (so exhaustively studied by A. O. Lovejoy in his book of that title). Early in the book, Darwin writes of "places in the polity" of nature, "places which are either unoccupied or not perfectly occupied by other beings," "a place in the natural polity of the country," "new places in the polity of nature." Eventually this progresses from simple to complex, and becomes a vision of "one long and branching chain of life," of which we know from the past only a few links (the nonsense of the "Missing Link" apeman seems to be based on this passage). As the book goes on, the figure modifies from the chain, either simple or complex, to that of a living tree, in a remarkable extended metaphor (earlier used in a letter to Gray that was one of the documents presented to the Linnean Society):

The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during former years may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have at all times overmastered other species in the great battle for life. The limbs divided into great branches, and these into lesser and lesser branches, were themselves once, when the tree was young, budding twigs, and this connection of the former and present buds by ramifying branches may well represent the classification of all extinct and living species in groups subordinate to groups. Of the many twigs which flourished when the tree was a mere bush, only two or three, now grown into great branches, yet survive

and bear the other branches; so with the species which lived during long-past geological periods, very few have left living and modified descendants. From the first growth of the tree, many a limb and branch has decayed and dropped off; and these fallen branches of various sizes may represent those whole orders, families, and genera which have now no living representatives, and which are known to us only in a fossil state. As we here and there see a thin straggling branch springing from a fork low down in a tree, and which by some chance has been favoured and is still alive on its summit, so we occasionally see an animal like the *Ornithorhynchus* or *Lepidostiren*, which in some small degree connects by its affinities two large branches of life, and which has apparently been saved from fatal competition by having inhabited a protected station. As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications.

Darwin continues to use the tree figure, later referring to the variety of species as "like the branching of a great tree from a single stem." Even this image, however, ultimately will not contain the infinite richness of ecological relationships in nature, which he describes as progressing "onwards in ever-increasing circles of complexity." The book's final paragraph achieves the ultimate transformation. It begins:

It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us.

With the image of the tangled bank, so reminiscent of Shakespearean lyric, Darwin embraces all the rich complexity of life. The image of the great Chain of Life is ordered, hierarchic, and static, essentially medieval; the great Tree of Life

is ordered, hierarchic, but dynamic and competitive, a Renaissance vision; but the great Tangled Bank of Life is disordered, democratic, and subtly interdependent as well as competitive, essentially a modern vision.

The minor metaphors in the work fall into place within this great organizing metaphor. "Struggle for existence" and "survival of the fittest," noted above, are other ways of looking at the tangled bank. The metaphors are epiphanies or showings forth; for the most part they image process in dramatic action, provide scenes "in an ever slowly changing drama": "as with mariners shipwrecked near a coast"; "to feel no surprise at sickness, but, when the sick man dies, to wonder and to suspect that he died by some deed of violence"; "when we no longer look at an organic being as a savage looks at a ship." A constant metaphor is language itself: "a breed, like a dialect of a language"; "It may be worth while to illustrate this view of classification, by taking the case of languages"; "Rudimentary organs may be compared with the letters in a word"; and so on. J. Arthur Thomson, in *Darwin and Modern Science*, praises Darwin's "clear visions" and they are all metaphors: "visions of the web of life, of the fountain of change within the organism, of the struggle for existence and of its winnowing, and of the spreading genealogical tree." Darwin says of morphology, defined in the *Origin's Glossary* as "The law of form or structure independent of function": "This is one of the most interesting departments of natural history, and may almost be said to be its very soul." Similarly, Aristotle says in the *Poetics* (in Bywater's translation): "But the greatest thing by far is to be a master of metaphor. It is the one thing that cannot be learnt from others; and it is also a sign of genius, since a good metaphor implies an intuitive perception of the similarity in dissimilars." By this criterion Darwin displayed genius as morphologist and metaphorist alike.

Perhaps the most surprising thing in *The Origin of Species*,

to those who think of Darwin as the type of the prosaic scientist, is that it repeatedly calls not for an act of understanding but for an act of the imagination. Darwin writes: "It is good thus to try in imagination," "How strange are these facts!" "no one with the most vivid imagination would ever have thought," "no one can have marvelled more than I have done," "the fact is a marvelous one," "But these cases are so wonderful," "Glancing at instincts, marvellous as some are," "We see the full meaning of the wonderful fact," and so on. The call is not only for imagination, marvel, wonder, but for the sort of immersion in nature that led Emerson to say "Books are for the scholars's idle hours." Darwin writes:

It is hardly possible for me to recall to the reader who is not a practical geologist, the facts leading the mind to comprehend the lapse of time. . . . Not that it suffices to study the *Principles of Geology*, or to read special treatises by different observers on separate formations, and to mark how each author attempts to give an inadequate idea of the duration of each formation, or even of each stratum. We can best gain some idea of past time by knowing the agencies at work, and learning how deeply the surface of the land has been denuded, and how much sediment has been deposited. . . . Therefore a man should examine for himself the great piles of superimposed strata, and watch the rivulets bringing down mud, and the waves wearing away the sea-cliffs, in order to comprehend something about the duration of past time, the monuments of which we see all around us.

It is good to wander along the coast, when formed of moderately hard rocks, and mark the process of degradation.

Perhaps not so far as it might seem from Proust's comparable venture in comprehending the duration of past time.

RETROSPECT TO DARWIN

Robert Scoon

IT IS ALTOGETHER FITTING that we should pause to celebrate the centennial of the publication of the *Origin of the Species*, and to reassess the significance of that event for our generation. For in these hundred years that have intervened there have been enough discussion, controversy, and research on the issues which Darwin raised to suggest that here we are confronted with one of the fateful steps in the march of human knowledge.

I

For the full story, we must ourselves adopt an evolutionary standpoint in order to bring out both the antecedent influences and the subsequent effects. In the first edition of the *Origin*, at various places in the text, Darwin acknowledged indebtedness to only a very few preceding scientists, such as Malthus for his views on the growth of population and Sir Charles Lyell for his interpretation of the fossil record. The next year (1860), Richard Owen published a critical notice of the *Origin* in the *Edinburgh Review*, in which he admonished Darwin's neglect of his precursors; and consequently in later editions Darwin inserted a rather sketchy and unsatisfactory historical introduction. It is clear, then, that he was fundamentally uninterested in anticipations of his own views, probably had no consciousness of how much of them he had absorbed, and in the specific case of Lamarck, denied that he had profited from the older thinker's researches. On the other hand, there is no evidence of a tendency to detract from or run down his predecessors, except possibly

in the case of Lamarck, and even that case is not at all clear. Moreover, we must not lose sight of the fact that for over twenty years he had been almost completely engrossed in working out something new in his own mind. We may, however, without malice, recall the generous tribute of Sir Isaac Newton to his scientific forbears: "If I have seen farther than Descartes, it is by standing on the shoulders of giants."

A succession of first-rate historians has traced back many diverse lines of evolutionary thinking antecedent to Darwin, which seemed to coalesce in his mind. Variation from generation to generation, the piling up of variations by inheritance in an enlarged temporal perspective, environmental selectivity, geographical distribution throughout different environments, competition for the means of existence, the disappearance of some varieties represented in the fossil record, the proliferation of complexity out of earlier simplicity—these were essential elements in Darwin's theory, yet each of them has been discovered in antecedent literature (though with varied terminology), and some of them were "notorious," to use Huxley's term. Loren Eiseley, in one of the latest and best of the historical studies, puts the situation as follows: ". . . the concept of the struggle for existence has sometimes been described erroneously as one of Darwin's contributions to general biological theory. By his own words he drew upon Malthus's treatment of human population problems and applied this concept throughout the organic world. Here again it should be remembered that knowledge of the struggle for existence in nature is to be found in Lamarck, Paley, and Lyell. By the early 19th century it was a commonplace." Inevitably such statements, and indeed this whole set of historical tracings, seem to produce the effect of whittling away Darwin's originality and achievement. Since there is no ground whatever for doubting the accuracy of these judgments, we are prompted to a deeper analysis of the situation with more sophisticated questions and finer distinctions.

In the first place, we have to bear in mind the slow and uncertain workings of our best minds in reaching fair and satisfactory judgments of evaluation on human achievements, as may be brought out by comparing the general receptions accorded Lamarck, Darwin, and Mendel by their contemporaries. The first of the three, who died in Paris in 1829, is now recognized as one of the great observers and theorists in the evolutionary movement. It is true that he had no firm evidence for some of his theories, such as that the giraffe grew a long neck in order to browse on the limbs of tall trees; and it is also true that, especially towards the end, he was infirm and poor and unwise in his public relations in the face of attacks of churchmen and others. Still, what have "infirm," "poor," and "public relations" to do with the validity of a scientific theory? Lamarck himself evidently believed they had a great deal to do with it, for he wrote at the end of his treatise: "It is not enough to discover and prove a useful truth . . . it is necessary also to be able to propagate it and get it recognized." Much as we may dislike this distinction between the truth and its acceptance, Lamarck was certainly right about it in his own case; for, although his work became known to a restricted circle of intelligentsia both in France and in England (Darwin had studied it but judged it a "wretched book"), still the recognition of Lamarck's genius was belated, to say the least, and came only after Darwin's publication had put the whole subject in the forefront of general interest.

An even more striking case of long delayed acceptance is that of the Austrian monk, Gregor Mendel, who in a paper delivered in 1865 before the Brünn Society for the Study of Natural Science and later published in the *Proceedings*, reported on his researches with edible and with sweet peas, and his discovery of uniformities in the inheritance patterns of certain characters in them. But at the time no one took any account of this discovery and it remained unnoticed until

1900, thirty-five years after its enunciation; then three geneticists, DeVries, Correns, and Tschermak, who were working along lines of investigation suggested by Weismann (1834-1914), rediscovered the natural uniformities of inheritance and also unearthed Mendel's paper, and recognized the crucial importance of his researches. The uniformities are now labelled "Mendelian laws of inheritance," and Mendel (if we may presume to make these comparative evaluations) now ranks with Lamarck and Darwin in the Hall of Fame of modern biological science. It is to be further noted that in Mendel's case, unlike that of Lamarck, the failure, however you diagnose it (local obtuseness, poor communications, but in any case not religious or popular prejudice), lies pretty clearly at the door of the scientists themselves. But in spite of these minor dissimilarities, both Lamarck and Mendel exemplify the delayed reaction, and *ipso facto* the significance of social recognition.

The contrast rests, therefore, between them and Darwin. He had several very influential and highly respected friends, such as the geologist Lyell and the botanists Hooker and Asa Gray; and prior to the publication of the *Origin*, he had acquainted them with his views and prepared them for an intelligent and sympathetic critique. In the second place, he was fortunate enough to gain the support of two doughty protagonists and original thinkers, Herbert Spencer and Huxley, both of whom helped to defend the evolutionary doctrine and also to extend it into new fields. And thirdly, we have to include in this consideration the tremendous popular furor aroused by Darwin's views, and not least the violent attacks on it. Thus it is clear that from the start Darwin received recognition, even though some of it was unfavorable; and it should not be difficult to imagine how the evaluation of succeeding generations would be affected by the welter of scientific, religious, and philosophical stimulations that were involved. Is there any wonder, then, that even

now, a hundred years after the event, our judgments must be revised in the light of the new data which historians have been turning up, data that subtly modify even some of the most objective and comprehensive and intelligent of previous appraisals?

Must we then admit that, in the light of this fresh information, our rating of Darwin's originality and achievement has to be lowered, as the first appearances seemed to suggest? All that we have actually admitted so far is that the recent studies entail a revision, not a detraction. We can go further and point out that the essence of what we have established is that previous judgments have been made without the knowledge we now possess and that the actual situation in 1859 now seems much more complex than most people, including Darwin himself, realized. In general, Darwin was not well versed in the history of his subject; and at least in his early judgments of Lamarck and his own grandfather, his estimates would not coincide with the best scientific opinion today. We are forced into one of those fine distinctions: in the sense that Darwin was unacquainted with, or blind to the significance of, antecedent investigations, his own creativity is untouched; but in so far as previous scholars, empirical and theoretical, had arrived at generalizations or principles which we now unhesitatingly class as anticipations or equivalents of, or partial ingredients in, Darwin's massive theory, to that extent we have to say that other men had been there before him, and consequently his originality, in the sense that he was first in a particular field, has to be modified.

This conclusion seems intricate and blurred; but in the light of the new evidence, I see no way of avoiding the qualifying restrictions. In other words, the situation in 1859 actually was far less simple and straightforward than the immediately subsequent accounts envisaged. Still, from a wider perspective we can realize that this whole approach is fundamentally negative—it operates to overthrow some mistaken as-

sumptions of our grandfathers and our fathers by showing that they were unaware of large amounts of pre-Darwinian data. But what is left? After these new limitations have been accepted in their full meaning, what did Darwin accomplish? This question is deceptively simple, and perhaps a little presumptuous for the present undertaking; yet it is worth the attempt in order to overcome the dissatisfaction we feel without it.

II

Curiously enough, the first problem that confronts us here is in a sense the opposite of those delayed recognitions which we have just been considering. It is the case of Darwin and Wallace, in which the evidence was not only widely known but even celebrated from the beginning; and yet the force of it seems somehow to have weakened, so that today we are likely to satisfy ourselves with the noble behavior of the principals. In my opinion, this attitude is less than just to Wallace; but it must be admitted that the complex of conditions we are called upon to assess is an extremely difficult one in which to strive for fairness.

In the first place, there would seem to be little room for doubt that the hypotheses of Darwin and of Wallace, not only concerning natural selection but also the formation of species, were substantially the same. Darwin in his previous correspondence with Wallace had admitted that he was working on the species problem, but had not revealed his tentative generalizations; yet when he received Wallace's paper in 1858, he recognized such a similarity between his and Wallace's views that he immediately sought the counsel of his friends Lyell and Hooker, and agreed to the joint presentation before the Linnean Society. That means that Darwin himself, without hesitation and in spite of his previous reticence, at once recognized the fundamental parallelism. More-

over, the year after the publication of the *Origin*, Darwin wrote to Wallace in regard to an anticipation of both their views by Patrick Matthew: "He gives most clearly . . . our view of Natural Selection"; and the phrase to underline is "our view." And then there is the testimony of Huxley, writing some years later: "The facts of variability, of the struggle for existence, of adaptation to conditions were notorious enough; but none of us had suspected that the road to the heart of the species problem lay through them, until Darwin and Wallace dispelled the darkness." Note that in this later but still authoritative opinion the real piece of originality by Darwin and Wallace consisted in an answer to "the species problem," specifically contrasted with the concept of "the struggle for existence" and other subsidiary ideas, and that it was attributed to both Darwin and Wallace without discrimination. What Huxley meant by the species problem is revealed in another passage: "The suggestion that new species may result from the selective action of external conditions upon the variations from the specific type which individuals present—and which we call 'spontaneous' because we are ignorant of their causation—is as wholly unknown to the historians of scientific ideas as it was to biological specialists before 1858." In the light of this evidence, it seems to me unjustifiable to withhold from Wallace the full credit for conceiving by himself the essential features of the theory Darwin propounded the next year in the *Origin*.

In the second place, although Darwin and Wallace had been in intermittent correspondence for many years so that, in spite of Darwin's canny reticence about his new ideas, hints of them may have crept into his letters inadvertently and stimulated Wallace, still there is absolutely no positive evidence to this effect; and, on the other hand, there is Wallace's own testimony that he wrote his paper while recovering from a fever on the island of Ternate in the Dutch East Indies in three days after reading Malthus's book on population.

The evidence thus definitely warrants the conclusion that Wallace reached his theory independently.

In the third place, Wallace presumably had his intuition shortly before he composed his letter to Darwin in 1858. But at the famous meeting of the Linnean Society on July 1 of that year, Darwin submitted a letter he had written to Asa Gray the previous year, outlining his position, together with a preliminary draft of his position constructed in 1844. Moreover, we now know that he had made an even earlier sketch in 1842. Hence, so far as priority of conception goes, Darwin antedated Wallace by sixteen years, and it was only in the matter of publication that they were simultaneous.

Here then we have another of those situations, like that of the anticipations, which cannot be reduced to a single comprehensive statement; and in the present instance, the simplest permissible description would necessitate the three separate items enumerated above. Nevertheless, our minds are incorrigibly short-hand operators, and they now insist on combining items one and two (the independent discovery of an important scientific principle by two creative thinkers) together with that part of item three which concerns simultaneous publication (in the literal sense of announcing it to the public). And in this abbreviated version, what we are presented with is the approximately contemporaneous discovery of a first-rate scientific truth made independently by two creative theorists. As such, it recalls to mind that other celebrated example, the invention of the infinitesimal calculus by Sir Isaac Newton and by Leibniz, substantially the same system but in different symbols. In the case of Darwin and Wallace, it seems to me defensible to overlook Darwin's priority of conception provided we keep in mind what we have done.

But we must not overlook the fact that the full answer to our question will have to include what happened after 1858, when the renowned meeting of the Linnean Society was held.

The next year, of course, Darwin published the *Origin*, whose centennial we are marking, and which put his full doctrine before all scientists and the general public. After that, there appeared a long list of books and monographs on zoological, botanical, geological, and psychological topics until his death in 1882. Undoubtedly the most influential of these works was *The Descent of Man* in 1871, in which, contrary to popular and ecclesiastical misconceptions, he did not maintain that man was descended from an ape; what he did assert was that human beings constituted an animal species which manifests the same evolutionary processes as other mammals, and presumably goes back to some kind of a common ancestor.

Wallace published a good deal, but nowhere nearly as much as Darwin; perhaps his most important work was the *Contributions to the Theory of Natural Selection*, but that did not appear until 1871, twelve years after the *Origin*, was concerned with the concept of "Natural Selection" rather than with the Species Problem or Evolution, and proved of no great consequence. Also, divergencies between his views and Darwin's soon began to appear, and these were set forth by Wallace in a book called *Darwinism* in 1889, seven years after Darwin's death. But also, while Darwin was still alive, Wallace began to insist on a higher influence in man's development, and this phase of his thinking seemed to be exaggerated by his excursions into spiritualism; while at the same time Darwin's emphasis on struggle and fitness was being improperly blown up into a positivistic interpretation of evolution. The scientific, philosophical, and religious atmosphere in the final quarter of the century was superheated, and we must prepare ourselves for rather ruthless discounting of various positions taken in public; still, at the center of it all, untouched by any popular or partisan emotionalism, there remain these sentences which Darwin wrote to Wallace: "As you expected, I differ grievously from you, and am

very sorry for it. I can see no necessity for calling in an additional and proximate cause in regard to men." And again: "I hope you have not murdered too completely your own and my child." And the main point to notice here is that Darwin, long after the publication of the *Origin* and in the midst of the controversies surrounding it, again acknowledges Wallace's joint authorship of the original theory, while strongly but sorrowfully dissenting from Wallace's subsequent bringing in of "higher agencies" to account for man. The tide of biological thinking was running strongly in the direction of a thorough-going naturalism, with emphases such as "nature's" mechanistic selectivity, and a bloody competition among the members of a species and sometimes between different species for the means of survival; so that Wallace's appeal to outside forces in the case of man seemed like mysticism in a laboratory. Nevertheless, we can now see that Wallace had dimly grasped something that he was not equipped to understand and that he could only hint at in misleading and inadequate terminology; he was on the track of the unique function of human mentality in evolution, particularly its manifold ways of interfering with, modifying, and adapting to its own ends, the ordinary processes of "nature." But the working out of that idea lay far in the future, and in fact is still with us; and meanwhile the temper of the times was not with Wallace.

We must go back briefly to "Darwinism," the title which Wallace chose for his discussion of his differences with Darwin. Wallace knew well enough what Darwin thought, how the two of them differed, and how they had made their joint discovery. It was not his fault that this term, "Darwinism," came to be used in many questionable senses, such as the view that Darwin formulated the doctrine of natural selection and that this was practically equivalent to the theory of evolution; or the idea that man was descended from a monkey. On the other hand, there are certain legitimate but not very enlightening uses of the term, to designate Darwin's

views in contrast with those of some other theorist, in the way Wallace employed it. Other significant contrasts appear with (a) Lamarck, particularly his belief in the efficacy of the organism's need and effort to produce heritable variations; (b) the doctrine of special creation and allied ideas; and (c) later theories such as those of Mendel. In fact, you can use the term for Darwin's views and insert whatever content you want; but there is one pitfall in this course, namely, the fact that on some points Darwin changed his mind. Witness the following passage from the *Descent of Man*, written in 1871, twelve years after the *Origin*: "I now admit . . . that in the earlier editions of my 'Origin of Species' I perhaps attributed too much to the action of natural selection or survival of the fittest." On the whole, this term, "Darwinism," aids us very little and may indeed confuse us, and we need not mourn because it seems to be falling into desuetude.

III

If we attempt to keep in mind the various limitations and refinements imposed on our thinking by the foregoing complications, we may now finally recur to the central theme, the significance for us today of the appearance of Darwin's *Origin* in 1859. Obviously there are three components in this theme: the author, the book, and the date; and it is already manifest that it is impossible cleanly to disentangle any one of these three factors from its congeners. First, Darwin is firmly paired with Wallace at this date, and Wallace simply cannot be ignored. Second, the book is linked with drafts going back to the early 1840's, and also again with several later works carrying forward the same point of view, such as the *Descent of Man*. Third and finally, the year 1859 inevitably brings up the previous year when the Linnean Society met, and no doubt other closely connected times.

But there is one monumental fact which defies all these subtleties, namely, what Sir William Dampier has well called

"Darwin's great torrent of evidence." It is worth quoting the passage, which concerns "the various converging streams of evolutionary thought—cosmological, anatomical, geological, and philosophic, which, blocked by the prejudice in favour of the fixity of species, were yet collecting deeper and deeper behind the dam. Darwin's great torrent of evidence in favour of natural selection broke the barrier with irresistible force, and let loose the fertilizing flood over the whole realm of thought." And on this point it was Darwin, without Wallace, to whom the credit is due. Also, with due deference to the many preceding thinkers and investigators, some of very high caliber, who produced what Sir William calls "the various converging streams," nevertheless it was Darwin who produced the single overwhelming body of facts for the various antecedent streams to "converge" into. There can be little doubt that Wallace had a very large amount of evidence, collected from his wide voyaging in South America and the Malay Archipelago; but partly because some of his specimens were burnt up in a ship, and partly for other reasons, he did not put together any memorable and convincing compendium.

Darwin, on the other hand, had not only enjoyed unrivalled opportunities for observation in South America and the Galapagos, but also had spent the next two decades collecting a strikingly comprehensive and systematic set of data on which to base his challenge to traditional modes of thought. Thus, with the most generous sentiments toward other creative thinkers in the same field, previous and contemporary, we come back to the point that Darwin produced a "torrent of evidence," which stood off the scepticism and the downright hostility of many eminent leaders of science and theology, and in the end won out.

In the second place, Darwin marshalled this tremendous mass of just plain facts in a way that evinced supreme intuitive ability. The variety of data used included, among others,

the following scientific specialties; and if we draw no sharp line between the *Origin* and the later works on this matter, the achievement is enhanced. (1) The anatomical evidences from homologies (suggesting relatedness of different species), and from useless organs interpreted as relics of a previous morphology. (2) The geological data in regard to fossils, which strongly suggested the existence in past ages both of radically different climatic conditions, and also of animal species which are now extinct, a view that would not square with the doctrine of special creation. (3) The results of many kinds of artificial breeding of domestic animals and plants, alongside natural variations under environmental influences. (4) The ecological evidence of the same species developing heritable variations under slightly different climatic conditions. The capacity to "see" the relevance of these widely diverse phenomena to one another, to admit their true implications contrary to established views, and to sense their rational connection—this is what I mean by marshalling the facts, and it stands to the credit of Darwin.

Thirdly, there is the creation of the central hypothesis itself, the "theory" of evolution, or the origin of species, as the author first called it. But here, as I have pointed out, Darwin and Wallace share the honors for the formulation of a great scientific principle. And it is in the light of this achievement that we must reinterpret those intimations of evolutionary ideas by earlier thinkers, the unearthing of which has seemed to derogate from both Darwin and Wallace. Many of these antecedents were simply observed facts within a very restricted field, such as, for example, the improvement of certain strains of cattle by careful breeding; this result by itself has no necessary theoretical significance, but it took on great theoretical interest when Darwin put it into conjunction with purely natural processes, and then considered both of them in connection with the species problem. We must, however, go further and admit the pre-existence of what

amounted to partially formulated evolutionary generalizations such as those of Buffon, Lamarck, Erasmus Darwin, and others. Yet these were only anticipations and precursors, and that is all they could be until the idea of which they were anticipations and precursors had been actualized, namely, Darwin's and Wallace's theory.

That joint theory, together with Darwin's masterful marshalling of his mass of evidence, can now be put into the perspective of a hundred years of discussion and of historical and scientific investigation. In this perspective, it has, as it were, been enlarged by both its intellectual ancestors and its descendants, which have become for us part of its full meaning. With regard to the descendants, it is enough for our present purpose to say that some of them, such as the findings of Weismann and Mendel, correct, supplement, or extend the original at weak points, while others merely soften or modify the early features. Taken together, the extensions into the earlier and the later reaches put the theory into its wider temporal setting, which, after all, is only carrying out one of its own ultimate implications, namely, the real significance of time. In earlier days, the religious doctrine of the Creator's set design for creation, together with the scientific inheritance of eternal, unchangeable types from the great Greek thinkers, had blinded men's eyes to the continuous alterations which were taking place, some of which men themselves were initiating. Newton, building on the work of brilliant astronomers of the preceding hundred years, succeeded in formulating the laws of cosmic space, explaining the various motions covered by those laws, and suggesting that the heavens were not heaven. Darwin and Wallace carried the scientific analysis of change into the temporal dimension; and although their researches concerned terrestrial phenomena, their basic conception of evolution could be, and was, successfully extended to cosmology. It remained for Einstein to integrate the spatial and the temporal dimensions by his Theory of Relativity.

We are then justified, I hold, in drawing a triple conclusion: (1) it was the publication of Darwin's *Origin* in 1859 which triggered the revolution in modern thought; (2) the theory which Darwin advocated was identical with that of Wallace, but the factual support on which it rested was the work of Darwin; (3) putting Darwin and Wallace together, and 1859 with 1858, we are dealing with one of those supreme intellectual landmarks of Western culture, comparable to the achievements of Newton and Einstein.

FROM DARWIN'S UNPUBLISHED NOTEBOOKS

Paul H. Barrett

IN THE TWO AND ONE-HALF YEARS after his return in October, 1836, from his journey around the world, Darwin published eight scientific papers and the book, *The Voyage of the Beagle*. During this period he also filled numerous notebooks with his speculations on evolution and related topics. Six of these books have been preserved almost intact, and are in the Library of Cambridge University.¹ Though the notebooks constitute a significant record of Darwin's search for a theory, only a few passages from them have been published to date.² Yet complete publication of the notebooks will no doubt alter various suppositions about the development of Darwin's thought, as, for example, the notion that Malthus furnished Darwin the key he needed for his theory. Owing to limitations of space, no such suggestions are offered here, but the following excerpts may well give a fresh view of the doubts and conjectures with which Darwin struggled in the course of developing his ideas.

Wherever possible, specific dates have been included in the transcription, though, unfortunately, Darwin did not date all his entries, and he wrote some of the notebooks concurrently with others. The excerpts selected here appear essentially in the chronological order of their composition; the punctuation has been regularized.

¹ I am indebted to Sir Charles G. Darwin of Newnham Grange, Cambridge, England, and to the Cambridge University Library for permitting micro-filmed copies of the manuscripts to be made, and to the All-University Research Committee of Michigan State University for providing financial aid.

² Francis Darwin, *The Life and Letters of Charles Darwin* (New York, 1897), I, pp. 367-371; also, Gertrude Himmelfarb, *Darwin and the Darwinian Revolution* (New York: Doubleday, 1959), pp. 147-180.

From Book "B,"³ written between July, 1837, and February, 1838:

As we thus believe species vary in changing climate we ought to find representative species; this we do in South America (closely approaching), but as they inosculate, we must suppose the change is effected at once, something like a variety produced (every grade in that case surely is not produced?).

The simplest cannot help becoming more complicated; and if we look to first origin, then must be progress. If we suppose monads are constantly formed, would they not be pretty similar over whole world under similar climates, and as far as world has been uniform at former epochs? . . . Every successive animal is branching upwards, different type of organization improving, as Owen says, simplest coming in and most perfect and others occasionally dying out: for instance secondary terebratula may have propagated recent terebratula, but Megatherium nothing. We may look at Megatherium, Armadilloes and sloths as all offspring of some still older type. . . .

With this tendency to change (and to multiplication when isolated) requires deaths of species to keep numbers of forms equable; (but is there any reason for supposing numbers of forms equable?—this being due to subdivisions and amount of differences, so forms would be about equally numerous); changes not result of will of animals, but law of adaptation as much as acid and alkali.

No doubt . . . wild men do not cross readily: distinctness of tribes in T. del Fuego, the existence of whiter tribes in centre of South America, shows this. Is there a tendency in plant's hybrids to go back? If so, man and plants together would establish Law, as above stated. No one can doubt that less trifling differences are blended by intermarriages; then the black [Negro] and white is so far gone that the species (for species they certainly are according to all common language) will keep to their type;

(Case must be that [in] one generation there should be as

³ This notebook, in its entirety, is scheduled for publication in Paul H. Barrett, ed., *A Transcription of Darwin's First Notebook on Transmutation of Species* (Cambridge: Bulletin of the Museum of Comparative Zoology at Harvard College).

many living as now. To do this and to have [as] many species in same genus (as is) requires extinction.) (Figure 1, page 394)

Thus between A and B immense gap of relation; C and B the finest gradation, B and D rather greater distinction. Thus genera would be formed, bearing relation to ancient types, with several extinct forms. For if each species (as ancient (1)) is capable of making 13 recent forms, twelve of the contemporaries must have left no offspring at all, so as to keep number of species constant. (Figure 1, page 394)

Heaven knows whether this agrees with Nature: *Cuidado* [Be careful!]

The new system of Natural History will be to describe limits of form (and where possible the number of steps known). For instance among the Carabidae. Instance in birds. Examine good collection of insects with this in view.

It would be curious to know [whether] in plants (or animals), . . . *races* have tendency to keep either parent (this is what French call *atavism*). Probably this is first step in dislike to union; offspring not well intermediate.

Prove animals like plants, trace gradations between associated and nonassociated animals, and the story will be complete.

It is absurd to talk of one animal being higher than another. We consider those, when the intellectual faculties (cerebral structure) most developed, as highest. A bee doubtless would when the instincts were. . . .

An originality is given (and power of adaptation is given by *true* generation) through means of every step of progressive increase of organization being imitated in the womb (which has been passed through to form that species). (Man derived from Monad each fresh [generation].)

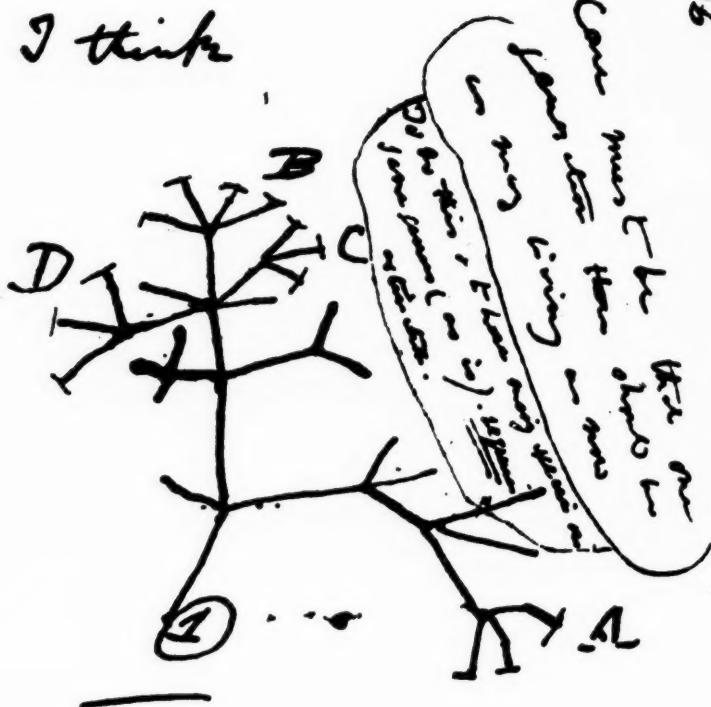
Mr. Don remarked to me that he thought species became obscurer as knowledge increased, but genera stronger.

Species formed by subsidence: Java and Sumatra Rhinoceros; elevate again, keep distinct, two species made. Elevation and subsidence continually forming species.

In some of the lower orders a perfect gradation can be found

I think

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Then between A & B arises
loss of relation. C & B. The
first generation, B and
rather greater distinction.
Then genera would have
formed. - loss of relation

FIGURE 1

so as make it ~~copying~~ complicated. Q.
Contradiction to
constant succession
& growth in progress.



So it thus fish can
be traced right down
to triple organization. —
birds — not.



FIGURE 2

from forms marking good genera by steps so insensible that each is not more change than we know *varieties* can produce.

In mere eocene rocks we can only expect some steps. I may ask whether the series is not more perfect by the discovery of fossil Mammalia than before, and that is all that can be expected. This answers Cuvier.

The father being climatized, climatizes the child. Whether every animal produces in course of ages ten thousand varieties (influenced itself perhaps by circumstances) and those alone preserved which are well adapted?

N.B. Well to insist upon (different animals) large Mammalia not being found on all islands; (if act of fresh creation why not produced on New Zealand?); if generated an answer can be given.

How can we understand excepting by propagation that out of the thousands of new insects all belong to same types already established? Why out of the thousands of forms should they all be classified [i.e., classifiable]? Propagation explains this.

This supposes world divided into Zoological provinces—united—and now divided again. Weakest part of theory [is] death of species without apparent physical cause.

Mr. Yarrell says that old *races* when mingled with newer, hybrid variety partake chiefly of the former.

In Marsupial division do we not see splitting in orders, carnivora, rodents, etc., just commencing!!!?

If population of place be constant (say 2000), and at present day every ten living souls on average are related to the 200th year degree, then 200 years ago there were 200 people living who now have successors. Then the chance of 200 people being related within 200 years backward might be calculated and this number eliminated. Say 150 people four hundred years since were progenitors of present people, and so backwards to one progenitor, who might have continued breeding from eternity backwards.

If population were increasing between each histrum, the number related at the first start must be greater, and this num-

ber would vary at each histrum, and the calculation of change of the relationship of the progenitors would have different formula for each histrum.

We may conclude that there will be a period, though long distant, when of the present men (of all races) not more than a few will have successors. At present day, [of] . . . two fine families, one will [have] successors for centuries; the other will become extinct. Who can analyze causes: dislike to marriage (some delay), disease, effects of contagious and accidents. Yet some causes are evident, as for instance one man killing another. So is it with *varying* races of man; . . . the whole races act toward each other, and are acted on, just like the two fine families (no doubt a different set of causes must act in the two cases).

May this not be extended to all animals? First consider species of cats, other tribes, etc., etc.

Mr. Owen suggested to me that the production of pointer (which Hunter says owe their origin to very early stage) and which follow certain laws according to species, present an analogy to production of species.

The distribution of big animals in East Indian archipelago, very good in connection with Von Buch Volcanic chart and my idea of double line of intersection.

Definition of species: one that remains at large with constant characters, together with other beings of very near structure. Hence species may be good ones and differ scarcely in any external character; for instance two wrens forced to haunt two islands, one with one kind of herbage, and one with other, might change organization of stomach and hence remain distinct. Where country changes rapidly we should expect most species.

Has the Creator since the Cambrian formation gone on creating animals with same general structure? Miserable, limited view. With respect to how species are, Lamarck's "willing" doctrine absurd. (As equally are arguments against it, namely how did otter live before being modern otter?) Why to be sure there were a thousand intermediate forms. . . . I should say the changes were effects of external causes, of which we are as ignorant as why millet seed turns a Bullfinch black. . . .

An American and African form of plant being found in Tristan D'Acunha may be said to deceive a man as likely as fossils in old rocks for same purpose!!

Can the wishing of the Parent produce any character on offspring? Does the mind produce any change in offspring? If so [is] adaptation of species by *generation* explained?

It will be well worth while to study profoundly the origin and history of every terrestrial Mammalia, especially moderately large ones.

The grand question which every naturalist ought to have before him when dissecting a whale or classifying a mite, a fungus, or an infusorian, is "What are the Laws of Life?"

It really would be worth trying to isolate some plants under glass bells and see what offspring would come from them. Ask Henslow for some plants whose seeds go back again, not a monstrous plant, but any marked variety. Strawberry produced by seeds? Universality of generation strongly shown by hybridity of ferns, hybridity showing connexion of two plants.

Animals whom we have made our slaves we do not like to consider our equals. Do not slave holders wish to make the black man other kind? Animals with affections, imitation, fear of death, pain, sorrow for the dead, respect.

The soul by consent of all is superadded, animals not got it, not look forward.

It may be argued against theory of changes, that if so, in approaching desert country or ascending mountains you ought to have a gradation of species; now this notoriously is not the case.

Get a good many examples of animals and plants very close (take European birds, instance Gould's case of Willow wren) and others varying in wild state to show that we do not know what amount of difference prevents breeding. . . .

Experimentise on land shells in salt water, and lizards ditto. Ask Eyton to procure me some.

From Book "C," written between February, 1838, and July, 1838:

Mr. Yarrell (give it as his theory) tells men he has no doubt that oldest variety takes greatest effect on offspring.

It would be very important to show wide range of fish and shells in tropical seas; it would demonstrate: not distance makes species, but barriers. . . .

There is this great advantage in studying Geograph. range of Quadrupeds: that [they were] either created on each point or migrated from those quarters where we know Quadrupeds have existed for ages.

The systematic naturalists get clear indication of circumstances in Geography to help in distinguishing empirically what is species. The Collector is directed to study localities of islands.

If man created, now languages would surely have been more homogeneous.

Very striking to see M. Bibron looking over reptiles; he often had difficulty in distinguishing which were species (though admirably), yet a glance would tell from which country.

But man, wonderful man . . . is an exception. He is mammalian, his origin has not been indefinite, he is not a deity, [and] his end (under present form) will come (is how dreadfully we are deceived). Then he is no exception: he possesses some of same general instincts and feelings as animals; they on other hand can reason, but man has reasoning power in excess instead of definite instincts. This is a replacement in mental machinery, so analogous to what we see in bodily [replacements] that it does not stagger me. What circumstances may have been necessary to have made man!—seclusion, want, etc., and perhaps a train of animals of hundred generations of species to produce contingents proper. Present monkeys might not, but probably would, the world now being fit for such an animal.

Using geograph. distribution of animals, I use (new step in induction) as keystone of ancient geography, species tell of Physical relations in time [when] formed; distribution tells of horizontal barriers.

I am sorry to find Mr. Yarrell's evidence about old varieties is reduced to scarcely anything, almost all imagination.

The simple expression of such a naturalist "splitting up his species (and genera) very finely" shows how arbitrary and optional operation it is; shows how finely the series is graduated.

Argue the case theoretically: if animals did change excessively slowly, whether Geologists would not find fossils such as they are.

When one reads in Ehrenberg's Paper on Infusoria on the enormous production, millions in few days, one doubts that one animal can really produce so great an effect. The spirit of life must be everywhere ambient. . . .

Has not the white man, who has debased his nature by making slave of his fellow black, often wished to consider him as other animal? It is the way of mankind, and I believe those who soar above, lack prejudices. Yet [we] have justly [the] exalted nature of man. Like to think his origin godlike; at least every nation has done so as yet.

Thought (or desires more properly) being hereditary, it is difficult to imagine it anything but structure of brain hereditary [sic]; analogy points out to this. Love of the deity [is] the effect of organization; oh, you Materialist! Read Barclay on organization!!

We never may be able to trace the steps by which the organization of the eye passed from simpler stages to more perfect, preserving its relation; this wonderful power of adaptation [is] given to organization. This really perhaps greatest difficulty to whole theory.

Henslow thinks if leaf of plant varies, all organs vary in plant. The variation in character of leaf of plant is remarkable; what is analogous to it in animals?

I fear . . . from vast opposition in opinion on all subjects of classification. I must work out hypothesis and compare it with results; if I acted otherwise my premises would be disputed.

A question of immense difficulty is whether Apterix descended from same parent with other birds, or branched off anteriorly. Think what principles are there to guide in this

opinion (*Excellent principle of abortion.*) *Isolation* of range tends to alteration view. . . .

Discussion useless until it were fixed, [viz.] what a species means. Two savages, two species; civilized man may exclaim with Christian, we are all Brothers in spirit, all children of one father, yet differences carried a long way.

The only cause of similarity in individuals (we know of) is relationship, children of one parent, races of animals—argue opening case.

Educate all classes, avoid the contamination of the castes, improve the women (double influence), and mankind must improve.

From Book "D," written between July 15, 1838, and October 2, 1838:

In my speculations must not go back to first stock of all animals, but merely to classes where types exist, for if so, it will be necessary to show how the first eye is formed. Now one nerve became sensitive to light (mem: whole plant may be considered as one large eye; have they smell? do plants emit odour solely for [whimsical] part of creation?), and another nerve to finest vibration of sound. [This] is impossible.

[Aug.] 19th. With respect to the Deluge, it may be worth adding in note that amongst the Mammalia of Europe, the shells of ditto, the shells of N. America, shells of S. America, there is no appearance of sudden termination of existence, nor is there in the Tertiary geological epocha.

August 29th. . . . Now what is *natural arrangement?* Affinities—what is that? Amount of resemblance? How can we estimate this amount, when no scale of value of difference is or can be settled?

Sept. 7th. . . . Here argue if it be said domestic fowls are descended from several stocks, then species are fertile. As long as opponents will not tie themselves down, they can find loopholes.

Sept. 8th. . . . In comparing my theory with any other it should be observed: not what [are the] comparative difficulties (as long as not overwhelming), [but] what [are the] comparative solutions and linkings of facts?

Sept. 9. . . . *Is there any mistake about Yarrells' Law? Is it local (not artificial) variation which impresses offspring most (and not time)?*

Sept. 29rd. . . . A bud may be transplanted and carry all their peculiarities; not so a seed.

If it were possible to *support* the arm of man, when cut off, it would produce another man. That the embryo the *thousandth* of inch should produce a Newton is often thought wonderful. It is part of same class of facts that the skin grows over a wound. Does likeness of twin bear on this subject?

Dr. Smith: every baboon and monkey, big and little that ever he saw, knew women; he has repeatedly seen them try to pull up petticoats, and if women not afraid, clasp them round waist and look in their faces and make the st. st. noise. . . . (This fact may be turned to ridicule, or may be thought disgusting, but to philosophic naturalist, pregnant with interest.)

From Book "M," written between July 15, 1838, and October 2, 1838:

Pride and suspicion are qualities which my Father says are almost constantly present in people likely to become insane. Now this is well worth considering if pride and suspicion can be well understood.

People, my Father says, do not dream of what they think of *most* intently: criminals before execution; widows not of their husbands. My father's test of sincerity.

. . . appetites urge the man, but indefinitely, he chooses (but what makes him fix frame of mind?) though perhaps he chooses wrongly and what is frame of mind owing to? I verily believe free will and chance are synonymous. Shake ten thousand grains of sand together and one will be uppermost, so in thoughts one will rise according to law.

To avoid stating how far I believe in materialism, say only that emotions, instinct, degree of talent—which are hereditary—are so because brain of child resembles parent stock (and phrenologists state that brain alters).

Now free will of oyster one can fancy to be direct effect of organization, by the [capacities] its senses give it of pain or

pleasure. If so, free will is to [the] mind what chance is to matter (M. Le Compte). The free will (if so called) makes changes in bodily organization of oyster; so may free will make changes in man. The real argument fixes on hereditary disposition and instincts. Put it so. Probably some error in argument, should be grateful if it were pointed out. My wish to improve my temper—what does it arise from but organization? That organization may have been affected by circumstances and education and by the choice which at that time organization gave me to will. Verily the faults of the fathers, corporeal and bodily, are visited upon the children.

The above views would make a man a predestinarian of a new kind, because he would tend to be an atheist. Man thus believing would more earnestly pray "deliver us from temptation." He would be most humble; he would strive to improve his organization for his children's sake, for the effect of his example on others. It may be doubted whether a man intentionally can wag his finger from real caprice; it is chance which way it will be, but yet it is settled by reason.

Origin of man now proved. Metaphysics must flourish. He who understands baboon would do more toward metaphysics than Locke.

From Book "N," written between October 2, 1838, and May, 1839:⁴

Octob. 4th. . . . I must be very cautious. Remember . . . Lavater. . . . Ye Gods!! Says fleshy lips denote sensuality. . . . Certainly neither a Minerva or Apollo would have them because not beautiful. Is there anything in these absurd ideas? Do they indicate mind and body retrograding to ancestral type of consciousness?

Malthus on Pop. p. 32, origin of Chastity in women, rationality explained, on the wish to support a wife a ruling motive. Book IV, Chapt. I on passions of mankind, as being really useful to them; this must be studied before my view of origin of evil passions.

M. Le Compte's idea of theological state of science, grand *idea*; as before having analogy to guide one to conclusion that

⁴ It may be well to note here that it was in October, 1838, that Darwin read Malthus' book on Population.

any one fact was correlated with law. As soon as any enquiry commenced, for instance probably such a thing as thunder would be placed to the will of God. Zoology itself is now purely theological.

October 8th. . . . All Science is reason acting (systematizing) on principles, which even animals practically know (art precedes science, art is experience and observation) in balancing a body and an ass knows one side of triangle shorter than two. Vide Whewell, *Induct. Sciences*.

Octob. 30th. . . . We can allow satellites, planets, suns, universes, nay whole systems of universes to be governed by laws, but the smallest insect we wish to be created at once by special act, provided with the instincts, its place in nature, its range, its—etc., etc.; must be [either] special act, or result of laws; yet we placidly believe the astronomer when he tells us [about] satellites, etc., etc. The savage admires not a shewn engine but a piece of coloured glass, is lost in astonishment at the artificer. Our faculties are more fitted to recognize the wonderful structure of a beetle than a Universe.

From Book "E," written between October, 1838, and July 10, 1839:

Octob. 4th. It cannot be objected to my theory, that the amount of change within historical times has been small, because change in forms is solely adaptation of whole of one race and some changes of circumstances; now we know how slowly and insensibly such changes are in progress.

Octob. 16th. . . . If they give up infertility in largest sense as test of species, they must deny species, which is absurd.

Did *man* spread over world as early as Elephants? If in next 20 years none of his remains found in the Americas, probably did not.

November 1st. . . . The wonderful species of Galapagos must be owing to these islands having been purely result of elevation, all modern and wholly volcanic. Argue might be propounded to have this character. [Worth] going there for. (Gales of wind would blend species.)

Having proved men's and brute's bodies on one type, almost superfluous to consider minds, as difference between mind of

dog and a porpoise was not thought overwhelming, yet I will not shirk difficulty.

Thinking of effects of my theory, laws probably will be discovered of corelation [sic] of parts, from the laws of variation of one part affecting another. (I, from looking at all facts as inducing towards law of transmutation, cannot see the deductions which are possible.)

Ascertainment of closest species (and naming them) with relation to habits, ranges, and external conditions of country, most important, and will be done to all countries, but naming mere single specimen in skins worse than useless. Yet there is no cure (I may say all this, having myself aided in such sins) (do not add name without reference to description) except describer having some high theoretical interest; "the great end must be the law and causes of change." A philosopher would as soon turn tailor as mere describer of species from its garments, without some end [in mind]. *Respect* good describer like Richardson.

December 2nd. . . . Herschel calls the appearance of new species the mystery of mysteries, and has grand passage upon problem! Hurrah!

December 16th. . . . It is difficult to think of "*Plato and Socrates*," when discussing the Immortality of the Soul, as the linear descendants of Mammiferous animals which would find its place in the *Systema Naturae*.

Jan. 6th. The rudiment of a *tail* shows man was originally quadruped (hairy, could move his ears). The head being six metamorphosed vertebrae, the parent of all vertebrate animals must have been like some molluscous bisexual animal with a vertebrae only and no head!!

March 9. . . . Wonderful as is the possession of voice by Man, we should remember that even birds can imitate the sounds surprisingly well.

. . . My principle being the destruction of all the less hardy ones and the preservation of *accidental* hardy seedlings (which are confessed to by Herbert); to sift out the weaker ones, there ought to be no weeding or encouragement, but a vigorous battle between strong and weak.

March 11th. . . . I am bound to insist honestly that the *sudden* change from Primrose to Cowslip is great difficulty (I should doubt if wild species ever formed like short-tailed cat or dog has been, without recurrent tendency in external conditions). (Sudden loosing [losing] of horns, I do not believe this Nature's plan.)

April 6th. . . . It may be said that wild animals will vary according to my Malthusian views, within certain limits, but beyond these, not; argue against this: analogy will certainly allow variation as much as the difference between species—for instance pigeons; then comes question of genera.

MARX AS SCIENTIST

Hyman Levy

ADJECTIVES LIKE DARWINIAN, Freudian, and Marxist are now part of every language. They are to be found in every modern dictionary and indicate how these three individuals have left their mark on modern thought. Marx, however, belongs to that very select few who have not only left their imprint on the language and the manner of thought of succeeding generations, but whose thinking is reflected in large-scale social changes. Whether or not one agrees with his mode of historical analysis, and with the world viewpoint intimately bound up with it, the fact does remain that his impact on social history has been enormous. Something of profound importance to the history of man is developing on this basis in Eastern Europe, in the Soviet Union, and in China, affecting the way of life, the values, and thinking of a large section of the inhabitants of this Earth; and only those who are blinded by prejudice will refuse the effort to understand. The name of Marx is inextricably interwoven with profound economic, social, and therefore psychological developments.

I

In accordance with Marxism, Marx himself has to be seen in his historical and social context, an individual carried forward on the crest of the wave of new thought of his period, in mid-19th-century Europe, and yet one limited and restricted by the relative poverty of knowledge that now, in an atomic age, stands out so clearly. What we have to ask, therefore, is: What was of permanent significance, and what was fleeting and transient, in Marx's analysis of social change?

By the time he had fled to England, in effect as a political refugee, to pursue his literally Herculean studies at the British Museum, his approach to the historical process and its successive social phases was already clearly defined. Living during a period when the power of relatively elementary science had already begun to manifest itself in industrial production, when the success of the scientific method in exposing Nature's regularities in the form of scientific laws was already established, it was to be expected that a penetrating mind such as Marx's would seek to subject the historical process itself to precisely the same type of investigation, searching for the appropriate methodology that would bring to view the prime movers that were shaping its course. What Newton had done for the motion of bodies influenced by external forces, Darwin had just done for the bodily evolution of Man from lower levels of life. Marx turned towards a study of the social group, of society, its successive forms of internal organization, and the factors responsible for its transformation from one level to the next.

In many respects, this was basically new ground. Newton had been concerned with relations between pieces of inanimate matter, the change in motion induced by attractive forces between them, or by the direct impact of one with another. His successors amplified and developed this approach—the elastic forces brought into play when materials are stretched, the extent of the compression of a gas when subjected to an externally applied pressure, the period of vibration of an elastic structure, and so on. His was a direct cause-effect relationship between *isolated* entities, where the cause, independently, in its own right, operated externally on the object affected; and the effect was calculated in terms of changes in position and speed. Out of this emerged the machine as an interconnected group of such entities, pieced together by the designer to function towards a preassigned end.

But here let us enter a definite *caveat*. Newton was not really immediately concerned with pieces of isolated matter. There are no *isolated* pieces of matter. Everything is in the environment of everything else. He had conjured up an imaginary situation, a set of ideas, which is precisely what a theory is concerned with. Thus the "machine" whose behavior became the subject of exact prediction was in effect a mental construct, abstracted, of course, from the world of physical reality. It was a synthesized abstraction. Thus the Mechanistic Determinism that grew out of this Newtonian approach had no greater validity in the physical world than the abstractions on which it was based. The range and extent of their validity could be tested only in practice. All this, Marx—and his co-worker, Engels—saw clearly. In seeking to absorb the lessons of science, they sought also to absorb the lessons of its methodology, by recognizing explicitly where lay its strength and where its weakness.

Accordingly, in turning to a study of human beings in their social groupings, Marx realized at once that the material with which he had to deal was of a different order from that considered by Newton and his successors. Although under the impact of external factors in their environment, men are also conscious, thinking, active beings. Unlike the Newtonian particle, they are active agents of change. They have a subjective life of their own; they think, feel, value, and act. In doing so, they change the world around them. More than this: they are individually born into a society complete with established traditions, conventions, and recognized modes of behavior. They grow up to accept and to respect in varying degrees certain values, a legal system with its responsibilities, a recognized code of conduct, and a mode of "earning one's living." In all these respects, individuals in the one society are subjected to similar conditioning factors, and yet, their individual histories being different, each is a unique being. Some respond to these forces almost in a mechanical way,

accepting them as part of nature just as they accept the rising and setting of the sun, hardly aware of their existence. Others see them as part of the special make-up of their particular society, consciously critical of their form and of their content.

Thus already there must exist a basic and detailed clash or unevenness in outlook, and therefore to some extent in practice, between the actual elements of the group. In the search for the appropriate abstraction, however, it is not, in the first place, the differences between the elements on which attention must be focussed, but on the similarities. To expose these, Marx draws very deeply on history, especially the history of European peoples, at successive stages of development —tribal and slave society, feudal society, capitalist society. In each of these, dissimilar elements fall easily and naturally into place. In tribal society, there is the chief and his family on the one hand, and the ordinary members of the tribe on the other. The latter owe allegiance to the former, they function in hunting and in cultivation under his jurisdiction, and he it is who administers what is conceived in that society to be justice.

Again, in feudal society there are the feudal lords on the one hand and the serfs on the other. The former own the means of cultivation, the land, and whatever primitive machinery exists; the latter are bound to their overlord, who exercises control over their means of survival. In both these cases, individuals are born and bred in an already well-established society, and at birth automatically fall into one or other of two social classes. The members of each class develop their own peculiar slant on the world as they experience it, seeing it either through the eyes of a traditionally established superior class or through those of the permanently damned underdog. By the time what has come to be known as capitalism has established itself, a similar class-division manifests itself, but in a very much modified form. In place of the serf, there is now the highly organized industrial worker with his

trade union behind him to ensure what he regards as an adequate return for his labor. On the other side, certainly in Marx's time, there stood the owner of the machinery, the capital that was to be used as the instrument through which the worker would apply his skill and his energy in production. Since the machine was an essential tool in production, far too elaborate and expensive to be personally possessed by the individual worker, as was the case with the earlier craftsmen who just preceded this phase, the right to work and to earn one's living rested, in effect, in the hands of the capitalist. Thus once again these two social classes viewed the world, including the social universe, through colored glasses. Moreover, since the wages of the worker, and the profit of the capitalist, appeared, so to speak, on opposite sides of the same balance sheet, a certain mutual, economic antagonism added a somewhat sinister tint to the picture each constructed of the other. Gains to the one class could be obtained, it appeared, only at the expense of the other.

To Marx, therefore, seeking the abstract picture he required in order to pursue his analysis, the existence of class division and class struggle, and their changing forms from one phase of history to the next, was an inescapable element. Nor is this abstraction to be regarded as false simply because, since his time, the incidence of ownership in the means of production has in some respects undergone great changes. Today, with the growth of investment trusts and of limited companies embracing a wide distribution of shareholders, the individual capitalist sometimes no longer exists, and his active functions are carried on by a body of salaried directors and executive officers responsible only to the shareholders, who have no interest whatsoever in the detailed operations of the company, but only in the dividend that is declared. The system functions as before, the personal capitalist has been in some cases transformed, by dissipation, into a large cloud of impersonal shareholders, and the role of the capitalist in actual organization is performed by wage-paid officials.

II

Marx did not regard the operation of classes in society as an independent discovery of his own. It had already been developed before his time. What was new was the analysis of the role of these classes in relation to the successive modes of production, and the part they played as motivating forces in the passage from one social phase to the next, and therefore as part of the whole network of factors responsible for the ideas, values, and general ideology of a period. Thus in his effort to find what, following Newton, might be called the *Laws of Motion of Society*, Marx begins by setting out the following abstractions as common to all phases of social history:

1. A general social background, characteristic of the period and constituting the matrix of thought, feelings, and actions of the members of the society. Within this matrix there exist various institutional forms of a political, legalistic, religious, and educational nature which reflect the predominant ideology of the period and to which the members of the society are expected to conform.
2. A technical level of production attained in that society, something which we in our day have seen to rise steeply under the impact of modern scientific discovery and its application to standardized production.
3. The relations into which men enter with one another in order to achieve this production: in the classical world, that between master and slave; in feudal society, that between lord and serf; and in capitalist society, that between wage-earner and employer or his agent. In the last case, the position of the worker has changed from that of previous societies. Now we are in a period of commodity production, where the merchant functions as a profit-making buyer and seller between the producing and the consuming ends. The worker is no

longer compelled by the law of the period to work for a particular master. In general, he sells on the market not the actual product of his labor, but his power to work, as if it were a commodity. The wage is the price of that commodity. As in the previous two stages, class division is still present. For in the capitalist epoch, there are on the one hand those who *must* sell their labor on the market in order to survive, and those who, possessing the legal right in that society because of their ownership of capital, that is, the machinery of production, to draw on the labor energy of others for their means of survival in food, clothing, and shelter, are not therefore so compelled. These, then, compose the rentier class.

This, then, represents in bald outline the primary elements which Marx put forward as sufficient to provide a basis for a connected analysis. His first purpose was to discover, if possible, the motivating factors that made men unconsciously create this history of change from one phase to another, to develop the ideologies referred to under (1), erect the corresponding social institutions, and acquire the techniques and skills of (2). To this end, he made a meticulous study of the detailed development in each phase, and especially at their points of transition; for example, the rise of merchants and of individual craftsmen during the latter part of the Feudal Period as a means of catering to the needs of the dominant class of that period, the growth of capital that finally gave rise to a situation in which the craftsman becomes a worker no longer in possession of his own adequate tools of production, and so one who is reduced to a mere purveyor of labor power, a worker hired to operate the machinery owned by others who do not rub shoulders with him on the workshop floor. To Marx, here is the atmosphere in which the feeling of class consciousness is engendered, the growth of solidarity among the men, the beginnings of Trade Union

action to force wage improvement, anti-accident legislation, adequate health conditions, reasonable hours of work, and so on. This pressure, and all its associated system of values and of ethics that is created within this group, is shaped and fashioned within the actual material conditions under which these men carry through their work. Given the material conditions under which men have apparently to operate, given these conscious beings naturally desirous of ameliorating their lot, a system of values, a mode of analysis, a cogent ethic, and expanding needs appear to follow almost inevitably. The outcome in action turns towards transforming the material conditions to meet these needs.

A similar process may be presumed to have occurred at corresponding points of earlier phases, in slave society and in feudal society. Thus the Marxist approach would begin by separating out from among the elements (1), (2), and (3) those that must be pin-pointed as the basic material factors that can be regarded as the prime movers of change, as distinguished from those that must be seen as part of the superstructure. To the former belong the materials of production, the relations of production, and the technical level at which it is carried through. To the latter belong the ideologies and outlook of the period and of the class, its values and its ethics, and the various institutional forms to which we have referred in (1). Within the field of the former lies also the whole subject matter of economics—the flow of energy and of skill from the worker, applied to the raw material, and transforming it to the finished product, that is, the proportion which returns in some form to the actual worker; the proportion which goes to the owners of capital, to be consumed or to be accumulated in further capital; and the price and exchange mechanism by means of which this is effected. Within the field of the latter, on the other hand, lie science and its historical development, the arts, literature, and music, each in its own way bearing, at each period, the imprint of the stage

of society within which it has been evoked, as well as the stamp of the particular class in that society which has been the instrument of its creation. The extent to which this *Materialist Interpretation of History* has been recognized, perhaps unconsciously, is evident from such accepted expressions as *The Social Background of Science*, of *Music*, or of *Art*, where it is no longer assumed, for example, that science is merely the history of ideas that have come to men by an abstract effort of the imagination, but that many of the concrete problems of science have been thrown up for solution by the growing needs of the society in which it is developing; and that there can be seen a two-way process at work, where the findings of science themselves react back on the society that cradled them. It is indeed in this illustration of an active and reactive process, especially in matters of social action, that the fundamental difference between the Marxist and the Newtonian approach shows itself. The mechanical determinism of Newton envisaged a unidirectional cause-effect relationship, where the cause was completely isolated from the effect it produced. It existed, as it were, in its own right. So also did the effect once it had been produced. To Marx, concerned with the activities of conscious beings who themselves learn in the process of acting, complete separation between action and actor would merely falsify the situation. The whole is one process, but the interplay between the two elements seen in it must not be obscured, for it is in the detailed nature of this interplay that we have to discern the *dialectical process* that replaces the simple mechanistic cause-effect relationship. This dialectical process is as essential a part of Marxism as the cause-effect relationship is of the simpler mechanistic approach of Newton. Without it there would be no theory of the dynamics of history, and no justification for the use of the term historical materialism.

It is not, however, my purpose here to enter into any analysis of the nature of dialectical materialism, but rather to un-

derline the point that Marx was very conscious of the limitations, indeed, the inapplicability, of the simple mechanistic approach to problems of social change, and that he had found in Hegelian dialectics, expressed in a materialistic rather than a Hegelian idealistic way, the key to the unravelling of the dynamics of society. Into this pattern it is also easy to fit the changing relation which corresponds to the interplay between the basic economic structure of a society and what has been called the super-structure, which, through institutions and ideologies, expresses men's moral, religious, and political principles, and from which both justification and criticism of the underlying economic basis are derived. The reciprocal influence of institutions and ideology on the one hand, and human behavior on the other, makes it possible to see in a rational way how irrationality among men manifests itself in the incongruity between their avowed principles and their economic circumstances.

It should be remarked that this interrelationship between social practice and ideology is very closely analogous to the interplay between theory and experiment in the narrower field of experimental science. Indeed, it is more than analogous; it actually embraces this narrower field, since scientific experiment is itself a form of social practice. The way in which, at any stage, theory acts as a guide to experiment, and how, as a consequence the theory is itself transformed, is an excellent example of the dialectical process at work. It is a fact that those scientists who are interested in, and seek to analyze, their own methodology, do not in general restrict themselves in this analysis to the methods of science to which they have become accustomed, but make an appeal to wider concepts of change which are, in fact, indistinguishable from those of dialectical materialism, although not seen as such.

III

Writing in the mid-19th century, Marx had already arrived at two conclusions which must be mentioned if justice is to

be done to his insight. One is that as each social phase draws towards its conclusion, when the negating factors are clearly beginning to transform the productive relations of that period, instability manifests itself in a series of economic crises, and, in particular, during the latter days of the capitalist period, by successive waves of large-scale unemployment. This would be evidence of the ineffectiveness of that organization of society in that it becomes unable to utilize to the full extent the available creative energy of its members. The other conclusion is that the history of all such social phases has been intimately bound up with the struggle of successive classes to achieve the position of dominance, while the working-class itself, on the basis of whose labor energy these classes have lived, has moved forward from one position of relative strength to another. In this analysis, the present capitalist phase represents the last stage, when the working class will at last itself move into the position of the dominant class, indeed the only class, owning and controlling the means of production, and planning out the economic development of its society in the light of the most modern knowledge. A one-class society is, of course, a classless society, and this, according to Marx, is the unconscious historical objective of preceding social changes. To carry this objective through in the most humanistic way demands that men become conscious of what is happening to them and the society in which they live, and that on the basis of this awareness they guide and plan it on its course. When this is done men pass from unconscious to conscious makers of history.

What is remarkable about Marx's analysis, elaborated and developed one hundred years ago, is not only the broad perspective with which he views the course of history, but the detailed treatment which he accords to each social phase and the minute examination of its economic structure. Many of his predictions, those, for example, relating to the occurrence of crises in the latter stages of capitalism, are extraordinarily accurate. But it is not at all surprising that on certain other

matters his expectations have not been realized. It seems apparent that to Marx the first cracks in the older structure, and the points at which the transformation to the new order of society would occur, would appear in the most advanced capitalist countries. In this, as might be expected, he was reckoning without his own influence on history. If in the weakest capitalist countries there existed individuals of the order of Lenin and Mao Tse Tung, who had thoroughly mastered the Marxist approach to these matters, then World Wars such as those of 1914-1918 and 1939-1945, shaking these weaker economies to their foundations, would provide precisely the opportunity for such men to initiate the passage to the new phase of society. True, they would be starting from a much lower level of capitalist development, and therefore the possibility of the survival of the new economy in a hostile capitalist environment would be correspondingly decreased. Nevertheless, this is what has actually happened, and today it is universally recognized that these new economies have come to stay. Capitalism is being transformed at its least developed and not at its most advanced points.

It may not be out of place at this stage to say a word about the relevance of this analysis to the most advanced seat of Capitalism today, that is, the United States of America. Marxism, as we have seen, has been arrived at by an examination of historical change. At any stage, it is envisaged that there exists in that society a people with a long established history of struggle combined, in its traditional background, with a multitude of institutions built up expressing these traditions. In Britain, for example, there are still what might legitimately be regarded as vestigial remains of feudalism. There is a long history of trade union struggle and an outlook and a set of values governing the code of behavior of trade unionists, and of trade union leaders; there is also a well-established political labor movement. Freedom of speech has been won at tremendous human expense, and would not lightly be dispensed with. All this, and a great deal more, has

its roots in the past, and lives in the present as part of the make-up of the working and middle classes. It is out of an analysis of this kind of continuous thread of history among European peoples that Marx distilled his theories. But the situation in the U.S.A. is in many respects quite different. It is a synthetic State of relatively recent growth whose population is drawn from a wide variety of peoples, mainly of Europe, and who, in a sense, have broken away from the continuity of tradition of the countries of their origin. A considerable section of the population is still in the position of "learning to become American." The background of a united tradition is likely to be much less strong than in other countries. The working class, faced with problems similar to those encountered by workers in other capitalist states, ought to react in much the same way. Nevertheless, in a new country, advancing with extreme rapidity along the capitalist route, many individual members of the working class may still find the opportunity for emancipating themselves, as individuals, from the ranks of their fellow workers and succeed in "making money." The atmosphere and the values of the commercial period, superimposed on a rapidly expanding capitalism, and even finance imperialism, are prevalent to a degree not paralleled by that of any other society. All this implies, not that Marxism is inapplicable to the situation in the United States, but rather that the growth and development of a united working class that can carry the society through to the next stage of a centralized planned socialist economy must be very different from that of other countries. Accordingly, the nature of the Marxist analysis in such a special situation calls for very special treatment; Marx himself does not appear to have given the matter any full treatment.

IV

To what extent can Marxism be regarded as a science? It is, of course, a theory of social change, and, therefore, like other theories, can have no greater validity than that of the ab-

stractions out of which it is formed. In the last resort, there is no way of testing its truth other than that of practice. But here a special difficulty manifests itself. In other branches of science, experiments are deliberately designed to this end, under controlled conditions. The control exercised by the experimenter is directed towards isolating the whole situation from those parts of the environment that are extraneous to his purpose, and towards sharpening and accentuating the characteristics he hopes to examine. Anything other than this, factors which get through his net, so to speak, he euphemistically refers to as "errors of experiment." As far as possible, the effect he seeks must be pure and undefiled.

But a social experiment, one on groups of human beings, perpetually sensitive to some extent to their whole environment, cannot possibly fulfill these conditions. It would appear to follow that there is no corresponding test of the validity of the Marxist abstractions except within countries like the Soviet Union and China where a centralized controlled planning system operates. But these are avowedly Socialist societies, so how can the validity of abstractions about capitalist society be tested there? Certainly it should be possible to examine something perhaps more fundamental —whether the process of development there also moves forward in accordance with dialectical principles, whether change takes place by internal contradictions, modified, of course, to the extent that they are consciously anticipated. If these trends were definitely established, they would correspond to a very important advance in scientific methodology. They would be concrete experimental evidence of the validity of the Marxist generalization of the cause-effect relationship. Outside of these areas, therefore, the experimental validity of the Marxist analysis can at best be compared with an observational science, like astronomy. We are not yet in a position to conduct controlled planetary experiments, although we are already on the threshold of such ventures. But, in

general, designing of experiments has no place in an observational science; Nature conducts its own experiments; and we observe, and draw our conclusions. When we observe that its next experiment is about to begin, we try to predict its outcome. It is therefore the power of prediction which, in this more restricted situation, is taken as the test of validity of the theory. Thus a detailed prediction of the course of an eclipse gives us the criterion we seek. Accordingly, if we are to test the validity of the Marxist analysis of capitalist society, we have to ask whether it has shown itself capable of predicting the course of the latter's development, in respect to those aspects which have not themselves been used as material for the construction of Marxism itself. With one qualification, to which we shall refer in a moment, Marx has, in this regard, very much to his credit. We need mention only two of these. Marx drew conclusions with regard to developments in monopolistic organization as one of the inevitable contradictions of a laissez-faire economy, long before these features had begun to manifest themselves. In the second place, he predicted the occurrence of chronic economic crisis and mass unemployment, as we have already indicated.

The qualification to which we refer marks a significant difference between Marxism regarded as a science and the more orthodox branches of science. A prediction that an eclipse will occur at 10:05 a.m. is one which is both qualitative and quantitative. It asserts the *occurrence* of an eclipse, which is a qualitative change in a preceding situation, and it sets out the *time* of the event, which is a numerical measure. To explain the factors at work which will ultimately lead to the growth of monopoly or to mass unemployment and not to date it, or to give the measures of this displacement of labor, is to make a qualitative prediction only. Marx's predictions are almost entirely of this nature. To assert that a certain analysis leads to the view that finally a social crisis of this nature will arise which will be so extreme that the only way

out will be a change in social organization to a socialist economy, leaves us still in the position of being unable to assert that the stage which is seen to be maturing is indeed the final stage. This fact has led to the well-known quip that a Marxist is either right in his forecast of the course of events, or if he is wrong, can immediately explain why he was wrong! His failure, it is presumed, has not been due to his analysis, but to his lack of quantitative knowledge of the developing situation. There is, after all, some justification for this retort, since it is not to be expected that a capitalist economy will necessarily require for its own needs the kind of statistical data which the Marxist will require for his predictions. A Marxist can handle only what nature—capitalist nature, that is—provides for his examination. We seem therefore driven to the conclusion that if Marxism is to be regarded as a science, it is mainly on the qualitative side that it can be tested in practice in relation to predictions about the course of capitalism. In a sense, of course, this is less a criticism of Marxism as a science than of sociology in general. Whether it will ever be possible to produce a science of sociology capable of providing the means for numerical predictions in an economy that is not under a centralized planning authority, we prefer to leave as an open question at the moment. One thing is certain, however: this kind of limitation is definitely absent in many sectors in the Soviet Union and in China where the degree of attainment of the successive Five Year Plans is systematically measured and compared with the planned predictions that had been made in advance. In so far as these plans are themselves based on a Marxist analysis of the prevailing situation, they provide a test of Marxism in action, analogous to the way in which engineering may be said to provide a test of the validity of mechanical principles.

MARXISM AND CONTEMPORARY SOCIAL SCIENCE

Alfred G. Meyer

I

MARXISM TODAY is more widely known, more influential, and more controversial than a hundred years ago. In the Soviet Union, Marx enjoys a status akin to that of Mohammed in Islam. In the West, assessments vary widely: some scholars consider Marx so discredited that he is not worth discussing; others regard him as a modern Antichrist. I myself believe that his relationship to contemporary social science and social thought is comparable, though not identical, to Einstein's relationship to contemporary physics: his views are controversial, to be sure, and entire schools reject them completely, as Einstein was rejected until recently by Soviet physics; but they do constitute a pioneering work which the social scientist can hardly afford to neglect.

In trying to assess the significance his work has today, I find it useful to make an artificial distinction between the total theory of Marx and certain discrete insights or methods associated with it. I shall first outline briefly that theory of revolution which is the core of Marxism and then discuss a number of disjointed elements that have occasionally been taken out of this total system of ideas and incorporated into other idea systems.

The entire structure of Marxist thought can be summarized by describing it as a theory of the proletarian revolution. Marxism is an attempt to prove that socialism is inevitable. Its founders and followers have supported this assertion partly by moral argument: capitalism so degrades the indi-

vidual, so frustrates his potentialities for creative development, that life under it is hell on earth, a mockery of all the ethical commands associated with the Christian-Liberal tradition. But man still retains his innate ability to shape a good life for himself, and socialism is the only form of social organization which can make the good life a reality. It is therefore morally inevitable.

To be sure, Marx denied that he was a moral philosopher or a prophet preaching to an evil society. When he asserted the *inevitability* of socialism, he used the word in a descriptive (or, as he would have put it, scientific) sense. The existing system could not last, and all the preconditions necessary for the birth of socialism had come into being. The core of this doctrine was and remains the Marxist description of capitalism and the "laws" governing it—that is, the manner in which the system functioned. According to these laws, capitalism was well suited to ensure economic growth in the early industrial age; and Marx therefore assigns the most important place to capitalism among the stages in the march of human progress. No social philosopher, perhaps, has rivaled the songs of praise that Marx and Engels have sung to capitalism in their *Manifesto of the Communist Party*. At the same time, however, Marxism asserts that to the mature capitalist society, the same laws that made it advance the progress of mankind would bring misery, chaos, crisis, and final breakdown. Institutions, habits, and intellectual traditions that had once strengthened the system would burden and fetter it intolerably and would hasten its collapse.

The most fundamental law governing the Marxist model of capitalism is that of the market. There are societies in which men produce only to satisfy their immediate needs or those of their masters. But under capitalism, they produce marketable commodities; and all their economic activity is therefore guided, nay, dictated, by the market. Moreover, even the labor power of the "immediate producers"—the

workers—is bought and sold as if it were a commodity. Therefore, the very lives of all people who are compelled to work for a living are subject to the same laws of the market and the laws governing market value. Life has become a market place, with human work, human emotions, human spirit bought and sold as a commodity.

To Marx, this transformation of human labor power into a commodity is what distinguishes capitalism from all other modes of production. Since he considered human labor to be the only creative force, its subjection to the laws of the market introduced into that market a curious element both constructive and disruptive: a commodity which, through the creation of values, could not only reproduce itself but could create far more than its own market value.

From this concept of human labor as a commodity producing surplus value, and from the relationship of this human commodity to the "dead" commodities (materials, machines, etc.) used in production, Marx derived additional laws governing both the growth and collapse of capitalism. These laws describe capitalism as a system compelled by its inner dynamic to accumulate capital at an ever increasing rate and to invest it in new enterprises even though a constantly falling rate of profit made investment more and more difficult. The force of these laws was seen to drive increasing numbers of capitalists to their ruin, swelling the ranks of the propertyless proletariat who in turn were too numerous to be of use to capitalist society. Capitalism was therefore a system that had, through technological and social progress, led mankind to the threshold of an era in which the material needs of all humanity could be filled, if only the technological achievements could be used rationally. But the laws governing capitalist production had caused the system to become entangled in hopeless difficulties: a free-enterprise system in which all individuals operated blindly and helplessly; a production capacity that could not be used; surplus human beings who

could not be employed; surplus commodities that could not be sold or even given away, even while poverty was increasing. These and similar problems, Marx believed, capitalism could not possibly solve without destroying itself. Inevitably, therefore, the system would collapse, and socialism would rise from the ruins. This death and rebirth of society would take the form of a revolution in which the proletariat would expropriate the capitalists and reorganize the economy on completely different, and rational, principles. With one stroke, society would now be able to satisfy all men's material needs. Inequality and exploitation would be abolished. Oppressive institutions and inhuman behavior would become superfluous and dysfunctional, and would wither away.

Crucial for this vision of inevitability was the belief that the proletariat would be equipped to destroy the old and erect the new. And, in Marxist theory, the working class is indeed endowed with education, rationality, discipline, organization, and other qualities which, taken together, transform them into a Chosen People who will deliver mankind into an earthly Promised Land.

This image of the proletariat and the society within which it exists is based upon several other important assumptions. There is, first, Marx's insistence that social studies are a science. To use his and Hegel's terminology: history proceeds in accordance with laws, *gesetzmässig*, and because of this it can be understood by men. This belief in man's ability to understand history is based, in turn, on the axiom that man is basically rational—and therefore potentially free to shape his own destiny. All of Marx's doctrine is based on a yearning for freedom and on the assumption that history is continual progress in the realization of freedom, a movement toward a society worthy of man. This vision of progress is related to a humanist ethic based on the principle that "man, for man, is the highest being," and that therefore everything which pains or degrades him must be abolished. From this follows the most radical criticism of social institutions. Just

as Rousseau and the Romantics contended that civilization is evil and spoils human nature, so Marx held that human relationships in civilized society (which is torn by class conflict) are false, evil, unworthy; and that, in such a society, man is *alienated* from nature, his fellow-man, and even from his own self. A class society dehumanizes man. Marx's moral indignation against this alienation pervades all his writings, even those that preceded his economic analysis of capitalism. He was a radical humanist before he became a Marxist.

Finally, Marxism is a *social* theory, not a universal philosophy. Marx was interested in human relationships and social institutions; he dealt with nature only in so far as it became part of human society, and had use for philosophy only to the extent that it was identical with scientific method. He held that every realm of existence must be understood in terms of its own laws; hence he did not contend that the methods and insights he advanced in his social theories were applicable to biology, physics, or general philosophy.

Marx's attitude toward philosophy is of central importance to an understanding of his doctrine. We have said that he dismissed it, or identified it with scientific method. Yet, he could not escape and did not deny the profound influence which Hegelian philosophy exerted on him, which focused its sights on concepts of reason and freedom. In "negating" this moral philosophy, Marx nevertheless retained and transformed it. In his view, moral philosophy was inadequate or meaningless if it did not coincide with, or even took the form of, revolutionary action designed to change reality. He saw philosophy and politics, thought and action, science and moral postulates, as coalescing, as Plato had hoped they would fuse in the philosopher-king. And just as the Platonic utopia demands such a philosopher-king, so the entire structure of Marxist ideas is held together only by the belief that the proletariat does indeed represent the actual merger of theory and practice.

If the above summary of Marxism is correct, then we

must conclude that Marx has seldom been well understood—even by his most devoted disciples, including perhaps Engels. The first important school that misunderstood and misrepresented Marxism were the theoreticians of the European socialist movement in the generation preceding World War I: the spokesmen of the Second International. Even though many of them battled fiercely to defend the letter of the Marxist Holy Writ against any attempts to revise or criticize it, Marxism in their hands became something quite different from the ideas of its founder. They turned his revolutionary radicalism into a comparatively tame search for gradual reform; for his fighting spirit they substituted something akin to fatalism; and instead of the contempt he had for liberal democracy, his followers had an honest veneration for constitutional government. The sophistication and subtlety of Marxian dialectics became the shallow determinism which non-Marxist scholars have always had an easy time refuting.

These disciples also perverted Marx's ideas by extending them from social science into natural science and general philosophy. Marxian dialectics, a complex set of heuristic devices that had served to make Marx sensitive to subtle and involved relationships, is far too esoteric in language and complicated in ideas to become the ideology of a broad political movement. Nor did it fit the scientific concepts and prejudices then dominant in the educated world. For these and other reasons, the conceptual tools of Marx were abstracted from their context and transformed into an utterly inadequate philosophy, called dialectical materialism, that was a caricature of Marx's thinking. Finally, the notion of the unity of theory and practice, central to Marx's ideas, was almost totally forgotten.

Further complications developed when a group of Marxist politicians came to power under circumstances which Marxist theory had not foreseen and could not consider as normal

within its own scheme of historic evolution. From the point of view of Marxism, the Russian revolution was an unexpected and rather deplorable freak. Its success—and the simultaneous and perhaps resulting failure of revolutionary socialism in the more industrialized West—forced the Marxist rulers to make adjustments in the theory; thus their Marxism became still another caricature. To be sure, the leaders of the Third International recaptured Marx's revolutionary radicalism. But, to give meaning to their revolutionary activity in a country that did not fit the Marxian model of mature capitalism, they had to alter, again and again, this model conception of the proletarian revolution. They tinkered with its timetable until it was completely different from that outlined by Marx. They redefined its aims and named different groups and classes as the principal actors on the revolutionary stage: the proletariat was now to be the leader in the bourgeois revolution; and the peasantry, despised by Marx as the most reactionary of all classes, was expected to serve as auxiliary force in the proletarian revolution. While theory and practice were postulated to be merged, their "unity" was no longer seen as incarnate in the proletariat. Instead, the Communist Party was regarded as class consciousness that had become flesh or institution; and the hegemony attributed to the proletariat was in fact to be exercised by the Party. In short, Communist theory thoroughly revised Marxist ideas concerning the aims and course of the revolution, the forces for carrying it out, and the organizational, ideological, and tactical measures designed to weld these forces together. Moreover, once they were in power, they had to make further alterations to explain and help formulate the policies that an isolated Marxist regime in a backward country would have to carry out. Marxism turned a full circle from the radical, liberational theory it had been. It became a theory of state, an ideology planning for and justifying an avowedly repressive, exploitative regime—a society

in which alienation had by no means been abolished and should not even be expected to be abolished for generations. Marxist methods of analysis, meanwhile, were transformed into a rigid, pompous, philosophically irrelevant catechism of dogmas, still called dialectical materialism.

II

Marxism was distorted and misunderstood by its own adherents because it was not in tune with their policies or with the circumstances that caused these policies to be adopted. The leaders of the Second International turned Marxism into a tame reform movement because Western European capitalism had undergone transformations which gave the working class a stake in the existing system. The leaders of Russian communism altered Marxist strategies because the model of development which Marx abstracted from Western experience was useless to them.

In other words, Marxism was inadequate as a precise guide both in the West and in Russia. Some of its central ideas were either wrong and have been discredited altogether, or they were correct only for a limited time and have been disproven by later developments. Still other elements have remained dubious. The question thus arises whether the inadequacy of discrete parts spells the collapse of the theory as a whole.

Before dealing with this problem, however, let us survey a number of Marxist notions that contemporary social science has found acceptable.

In many ways Marx is quite old-fashioned and belongs strictly to the Victorian age. His vocabulary, for instance, is so outdated that it very early became a hindrance to the understanding of his theories. But, in other ways, he is indeed quite modern—so much so that many of his views are becoming acceptable only now. Much of the dialectic, for instance, despite its cumbersome jargon and outworn imagery,

is highly contemporary. It is a view of society which has many traits in common with Parsonian sociology. Like Parsons, Marx views societies as systems of action—structured and changing totalities in which individual phenomena are explained not so much in terms of cause and effect, but in terms of their functional relationships to the system as a whole. Marxian dialectics as well as contemporary social theories point out that seemingly identical phenomena may be quite different depending on their functional relationship to different total systems. Similarly, dialectics has many traits in common with Freudian psychology, which contemporary social science may also consider old hat, but without which it could hardly have developed to its present state. The conflict within the human personality as depicted by Freud is to his model of man what the class struggle and other "contradictions" are to the Marxian model of society. Many Freudian notions are as dialectical as can be, such as the idea of ambivalence, or the developmental model of personality in which any one stage may remain as a fixation long after it has outlived its functionality. There are striking resemblances between the Freudian theory of consciousness and the Marxian concept of ideology. Parallels such as these may be repeated *ad infinitum*.

Marx's institutional determinism, too, is implicitly accepted by most contemporary social scientists, especially by the so-called behaviorist school, now becoming more and more prominent. One might easily go so far as to say that institutional determinism is the basic assumption on which all contemporary social science is tacitly based. Most behaviorists would also accept the idea that society is structured: hence the concept of groups and classes which have identifiable interests and are in conflict with each other.

Similarly, contemporary social science has accepted with scant dissent the notion of the sociology of knowledge—a theory which relates the pursuit of knowledge and the de-

velopment of philosophy, religion, art, and culture to the social problems, the group struggles, the grievances, and aspirations prevailing at given periods and in given societies. Knowledge, truth, and even beauty, in this theory, turn into ideology, lose their claim to absolute validity, and become relative. To be sure, this theory did not originate with Marx. But he made it his own; and many who resisted it denounced it as Marxian, so that it has become closely associated with his doctrine.

It is interesting to observe that the various elements of Marxism that have come to be accepted by contemporary social science and philosophy have nonetheless remained controversial, because what is commonplace to the social scientist may be quite contrary to beliefs and assumptions cherished by the people outside the ivied halls. Could it be that the increasing acceptance of discrete ideas from the Marxist system is somehow related to the widening of the gulf separating the academic professional from the society in which he works?

Even if this assumption were correct it would not mean, of course, that individuals who apply Marxian concepts in their pursuit of knowledge have necessarily become Marxists or socialists or revolutionaries of any sort. At the same time, we should be aware that socialism as a normative idea is in fact finding wider and wider acceptance in the Western and non-Western world and that this may at times further the gradual rediscovery and, as it were, rehabilitation of Marxist ideas, taken disjointedly out of the total theory. Living in a most profoundly revolutionary age, more and more people in Western society develop serious doubts about the virtues and advantages of the free enterprise system. In a society where the cash nexus pervades and perverts all human relationships, a society alarmed by delinquency and neurosis, or bored by the commercialized entertainment media, intellectuals have now begun to talk about the alienation of man, of his transformation into a thoughtless and spineless robot, a caricature

of humanity. All these ideas—and they are spreading—can be found amply in the writings of Marx and his followers.

If in this fashion Marxian criticism of contemporary society is becoming more and more acceptable, we can point also to some Marxist norms, some of his prescriptive ideas which have similarly become part of our intellectual heritage. Most of us now pay at least lip service to the idea of social democracy, according to which liberal constitutional government is meaningless if social or economic inequalities are too great, or if substantial portions of the population live in substandard conditions. Most of us would now accept at least in theory the proposition that certain basic material needs must be satisfied before society as a whole can prosper, and that, if necessary, the government ought to interfere in the country's economic life in order to satisfy these needs. In other words, we have accepted the idea of the welfare state and of socialization. And if "we" is meant to include Western nations outside the United States, then it becomes clear that more than lip service is being paid to it.

Much that is part of Marxism has thus become part of the assumptions, methods, or norms of contemporary social scientists and intellectuals. But I have intentionally stressed the fact that these elements were taken out of the total theory and were adopted disjointedly. As a consequence, they are not only used for different purposes and functions in different idea systems, but they themselves undergo change. The concept of group interest and group conflict taken out of the Marxist theory of revolution is different from *the class struggle* Marx talked about. The institutional determinism of cultural anthropology is not the same as the Marxist idea of superstructure. The sociology of knowledge as a generally accepted theory is different from the Marxian concept of ruling class ideology. In short, contemporary social science, despite its own latent feeling of alienation from society, has tended to use Marxist concepts in theories that are less revo-

lutionary, less catastrophic, less critical, or subversive of existing institutions. The modern social scientist has smashed the structure of Marxist ideas and out of the wreckage picked numerous bricks with which to build structures of his own—if indeed we may speak of structures when dealing with contemporary social scientists of the behaviorist school. For much of social science, following the lead of Logical Positivism, abhors grandiose over-all theories. It concentrates instead on the individual stones of insight or methodology and attempts to polish each one individually into a factual or methodological gem; it spurns all attempts to place these gems into a diadem of knowledge about man, his history, or his institutions. In this, the behavioral social scientist resembles the modern artist whose aim seems to be to make any one technique or artistic device yield a maximum of effect in portraying a mood or solving some other aesthetic problem. Here, too, many of the devices and methods have been pioneered by the classical masters; but in their artistic work the methods were no more than the means for creating a much larger whole, bricks with which to build ambitious structures. So, in modern art as in contemporary social science, the fashioning of the bricks has become an end in itself. In social science, it should be obvious that nothing could be farther removed from Marxism than the detailed and unconnected studies of behavioral research.

III

Nonetheless, the totality of Marxist theory, long neglected and often refuted, has resisted both neglect and refutation, at least to a considerable degree. While, as we have seen, the acceptance of individual insights does not mean the "rehabilitation" of Marxism, the vague premonition of gloom overtaking the Western world, the awareness of man's alienation in a commercialized world, the recognition of serious shortcomings in constitutional democracy and free-enterprise eco-

nomics—all these tend to lead back to Marx and to his diagnosis of capitalism. Stripped of its many serious shortcomings, this diagnosis doubtless retains much validity. Meanwhile, however, the prognosis Marx deduced from it does not appear to have gained much acceptance. The gloomy appraisal Marx gave our society often seems plausible; but the rosy prediction of a revolution to end all revolutions and of a truly Good Society is something few people in the West would consider worth discussing. Marxism was the last of the great optimistic ideologies in Western thought. Our own generation no longer shares his confidence in the prospect of inevitable change for the better. That confidence was shattered by the catastrophes of World War I and the Russian revolution.

At the same time, however, this confidence pervades the ideologies of the nations now rebelling against the Western world and also pervades (as dogma) the official doctrine of the communist world. Moreover, in vast areas of the globe Marxian methods and insights are widely accepted as the most valid or meaningful guides to an understanding of present problems and prospective developments. Overwhelming numbers of political leaders in Asia, Africa, Latin America, not to mention the Soviet orbit, look at reality through Marxist spectacles. To be sure, their interpretation of Marxist methods often is a distortion of the founder's ideas. Their diagnosis of reality, though couched in Marxist language, necessarily differs from his description of mid-19th-century capitalism. Even their ideas of the revolution—which classes will be active in it, what strategies they are to employ, how its short- and long-range goals ought to be defined—deviate substantially from the scheme of development outlined in the Communist Manifesto. The revolution of our time is markedly different from the Marxian blueprint. And yet today's revolution has sufficient features in common with that blueprint to allow for a degree of continuity between the Marx-

ism of 1859 and that of 1959, especially since no other school of social philosophy has dealt systematically with society-in-revolution.

I believe that this difference between Marxism and non-Marxist social science is the key to an understanding of the theory's staying power. Its serious shortcomings notwithstanding, it has remained the only systematic attempt to describe revolutionary change in the modern age. In its communist variant, it is also the only major theory that has tried to analyze and solve the problems of underdeveloped nations in an all-encompassing fashion. Non-Marxist social science may often have done a better job of investigating comparatively stable societies. Marxism concentrates on crisis and revolution and has not encountered serious rivals in the pursuit of such knowledge.

Until more satisfactory theories are propounded to deal with the revolution of our time in broad, systematic fashion, and in a manner that will catch the imagination of the peoples concerned, students of the 20th-century revolution will have to lean on Marxist doctrines, borrow from them, try to improve or refute them; but they will not be able to ignore them. At the same time, the present-day survival or rebirth of Marxism—however transmuted its form may be—serves much the same function the original theory served a century ago: its ability to convince and to convert, infinitely greater today than in 1859, is a symptom of deep trouble, a danger sign of profound ills in Western society that may lead to severe disturbances and possible collapse.

MARX, CLASSICAL ECONOMICS, AND THE LABOR THEORY OF VALUE

John P. Henderson

I

THE ORIGINS OF MARX's interest in political economy were in a large sense practical rather than theoretical. In the preface to the first edition of the *Critique* (1849), he relates that his first brush with the intricacies of economic policy came during his tenure as editor of *Die Rheinische Zeitung*. He makes the observation that while his academic training and professional experience with the fields of jurisprudence, history, and philosophy stood him in good stead for editorial undertakings, he found he was "embarrassed . . . when I had to take part in discussions concerning so-called material interests." The tone and direction of these discussions concerning the economic significance of free trade, protection, and the subdivision and rights of private property (particularly as they affected the income of the working class) were fashioned after the influential thought of the French socialists. This meant that in Marx's circle of experience, economic issues were usually discussed against the background of Proudhon's writings. "I declared myself against such botching," Marx continues, "but had to admit at once in a controversy with the 'Allgemeine Augsburger Zeitung' that my previous studies did not allow me to hazard an independent judgment as to the merits of the French schools."

In order to prepare to deal with the background of these economic issues, Marx in the early 1840's commenced his studies of political economy. At the same time, he undertook a re-evaluation of Hegel's *Philosophy of the Law* to come to

grips with the problem of private property and its origins—the basic issue in the contemporary controversy over forest thefts and the rights of the Mosel peasants. After a reworking of Hegel's law thesis, he concluded that the proper understanding of society was to be gained by the study of political economies and their history. A combination of forces, therefore, led Marx to the practical problems of political economy long before he had acquired any competency as an economic theorist.

The formative years of Marx's study of economics covered the period from 1842 to 1859, finally culminating in *A Contribution to the Critique of Political Economy*, a work praedeutic to the theoretical contributions of the three volumes of *Capital*. In several respects this period of investigation was transitional. First, it provided the time span during which Marx transferred his scholarly pursuits from philosophy and jurisprudence to political economy. By the time the *Critique* was published, Marx was well on his way to serious work as an economic theorist; he became dedicated to a theoretical analysis which could deal with the "confounded ramifications of political economy" that had emerged during the development of British classical economic thought. Second, it was a transitional period in that Marx entered it as a journalist and active political participant, and left it in 1859 as a dedicated intellectual sleuth, working in the British Museum six days a week, eleven hours a day. Certainly no library page, carrying his numerous requests for volumes written in six or seven languages and covering most of recorded history, could have concluded that this particular bookworm was setting forth an economic doctrine that, one hundred years later, would still be considered crucial.

Marx's last strictly philosophical research was *Feuerbach*, completed in 1845. The attack upon Proudhon, *The Poverty of Philosophy*, was written in 1847, and while it was essentially a criticism of the author's conception of the metaphysics

of political economy, it also reflected a strong bias in favor of a philosophical approach to the subject, rather than a criticism of the economic principles set forth in Proudhon's work. Each of these early volumes showed the influence of an emerging thesis *vis-à-vis* the economic interpretation of history, but neither was as oriented to developing basic economic principles as was the *Critique*. With the publication of the *Critique*, the author revealed a much wider comprehension of British classical economics than had been apparent in the earlier criticisms. The difference in emphasis between the *Critique* and early works is understandable, since it was not until 1850 that Marx moved to London and began his meticulous and exhaustive study of "the enormous material on the history of political economy" deposited in the British Museum.

The study of political economy in the 19th century, certainly at least so far as Marx was concerned, meant the study of the economic principles that had emerged in the course of English thought, a discipline sharply influenced by an anti-romanticist and anti-purist rationalism. Marx recognized the contrast very early, and in his work on Proudhon explains the juxtaposition of Ricardo (the leading representative of the British economic tradition) and Proudhon. He says:

Ricardo takes his starting point from present-day society to demonstrate to us how it constitutes value—M. Proudhon takes constituted value as his starting point to construct a new social world with the aid of this value. . . . Ricardo's theory of values is the scientific interpretation of actual economic life; M. Proudhon's theory of values is the utopian interpretation of Ricardo's theory. Ricardo establishes the truth of his formula by deriving it from all economic relations, and by explaining in this way all phenomena, even those like ground rent, accumulation of capital and the relation of wages to profits, which at first sight seem to contradict it; it is precisely that which makes his doctrine a scientific system: M. Proudhon, who has rediscovered this formula of Ricardo's by means

of quite arbitrary hypotheses, is forced thereafter to seek out isolated economic facts which he twists and falsifies to pass them off as examples, already existing applications, beginnings of realization of his regenerating idea.

The contrast was thus drawn between a writer such as Ricardo, who developed and designed a theoretical framework to fit the policies and facts of British society, and Proudhon, who had constructed a theoretical model *a priori*. So far as Marx was concerned, there was only Hobson's choice, and he also took the "actual economic life" of Ricardo's England as the empirical base for the development of his own political economy.

II

To begin the study of political economy in the fourth decade of the 19th century was to begin with Ricardo's *Principles*, and the genesis of this volume was "On Value." At the same time, Ricardo's stress upon value theory was not atypical, since the subject was also the starting point of Malthus' *Principles*. In addition, Adam Smith's *Wealth of Nations* (in Ricardo's day the classic work in the discipline) had begun with a discussion of the origins and causes of exchange value, and even Quesnay and the French Physiocrats had built a system of analysis upon propositions regarding the origins of value. For Marx, therefore, as for any economist of his day, the burning question confronting economics was the analysis of the causes and origin of value. By the time he commenced his study, the subject had been further delineated by Ricardo so that the labor theory of value was the all-important underpinning to the accepted system of analysis. To a very large extent, the study of political economy meant the study of value theory and the conundrums over which Ricardo and Malthus had struggled in their respective approaches to economic policy. Therefore, to understand Marx's concern with formulations *vis-a-vis* the

theory of value, one must comprehend Ricardo's struggle with the same issue.

The most fundamental economic crisis which Ricardo's England faced during the Napoleonic era grew out of the basic dependence of her expanding industrial economy upon domestic agriculture. The physical output of English agriculture, which once had satisfied domestic needs and allowed for an exportable surplus as well, had become increasingly deficient. A major disproportion had developed between British agricultural input and output. The amount of productive power going to agriculture was obviously inadequate to feed the increasing population. At the same time, the French wars had cut off supplies from the Baltic and made importation hazardous and unreliable, so that England was dependent almost exclusively upon her own agrarian resources.

Symptomatic of the attitude of the agricultural interests which controlled Parliament was the implementation of a policy to encourage British farming through the use of protective tariffs against foreign grain. Theoretical support for the protection of agriculture (by means of the corn laws) was provided by individuals such as William Spence and William Cobbett, whose treatises argued that England not only could but should feed herself. The major economic argument for such policies was the Physiocratic theoretical premise which claimed agriculture as the only true source of value and national wealth. The answer of those who believed in free trade, commerce, and industry was expressed by James Mill, whose social conscience, perhaps motivated by his interest in the East India Company, was representative of a growing resentment against the agricultural monopoly. When peace appeared imminent in 1814, industrial and commercial forces pressed for a repeal of the corn laws. This agitation produced the controversial corn law debates of February and March, 1815, when pamphlets and petitions flooded the country as

advocates on both sides attempted to influence the public and parliamentary debate.

The chief protagonists in the public debate were Thomas Malthus and the retired stock broker, David Ricardo; the economic issues they had been debating privately for two years were presented publicly in opposing tracts. Malthus' *Grounds of An Opinion on the Policy of Restricting the Importation of Foreign Corn*, published on February 10, 1815, was encountered within two weeks by Ricardo's *An Essay on the Influence of a Low Price of Corn on the Profits of Stock*, strongly recommending repeal of the corn laws.

In the *Essay on Profits*, Ricardo supported repeal of the corn laws by pointing to the adverse effects of diminishing returns in agriculture. Assuming that agriculture was the only sector of the English economy which required the use of inferior resources, he contended that a re-allocation of resources, achieved by importing foreign corn (labor and capital would move out of agriculture and into manufactures), would raise profits and, in accordance with Adam Smith's theory of accumulation, encourage economic development. Profits, Ricardo said, were a function of the ratio of wages to total output, and the increase in wages caused by the use of less fertile land would deter the growth of total output because it would reduce profits and investment.

Malthus, who had previously presented his own contention that a deficiency of effective demand for manufactures would plunge England into poverty if agricultural protection were removed, was quick to protest against Ricardo's argument. His chief criticism, however, had to do with Ricardo's residual theory of profits. Malthus claimed that profits were determined not by wages but by the prices consumers paid for products. Ricardo's theory to the effect that *if wages rise, profits must fall*, was wrong. Malthus argued it was clear that the amount of profit a commodity would bring was a function of market conditions, not of a contractual agreement be-

tween labor and capital. Both prices and profits, he argued, were determined in the market by the forces of demand and supply. Changes in exchange ratios were obviously responsible for the prices of particular commodities, and a rise in the price of one commodity (corn) would alter the exchange ratio of all commodities. As for the policy in question, he argued that due to the secondary effects of a rise in the price of corn, profits would not be affected at all.

Thus, Malthus ingeniously pointed to arguments that appeared to contradict Ricardo's hypothesis that the accumulation of capital accompanied by the use of inferior resources would lead to a fall in the general rate of profits. Malthus rested his case on the effect upon profits of changes *internal* to the price mechanism. The aggregative approach used in the *Essay on Profits*, he contended, could not sufficiently explain profits and their relation to rents, because it failed to account for the changes in money, costs, and prices which would accompany the process of accumulation and the use of inferior resources. The lacuna in Ricardo's principles which Malthus so effectively exposed was the former's failure to deal with the intricacies of value and price.

Ricardo's next effort against the corn laws was the publication of his *Principles of Political Economy* in 1817. The first chapter was titled "On Value," and contained Ricardo's first formulation of the labor theory of value. There is not much doubt, since the recent publication of the ten volume *Works of Ricardo* (edited by Piero Sraffa and Maurice Dobb), that Ricardo's struggles with the theoretical intricacies of value theory were attempts to solve the riddle of the relation of the price of commodities to the hypothesis that profits constituted a residual. If profits were a residual of wages, and if the level of wages was dependent upon the cost of living (expressed as a function of the price of corn), the use of inferior land for corn would raise wages and reduce profits.

Looking at the general rate of profit from the standpoint of

the ratio of "surplus produce" to the amount of invested capital, Ricardo argued that the major determinant of the rate of profit was a change in the labor cost of wage goods. Wage goods were in turn classified as the necessaries going to the laboring class, goods such as corn, cheap cloth, and lodging. The value of these wage goods was the amount of total product consumed by the wage-earning class, and the residual was profit. A rise in the "fund of the wage class" would lower the aggregate amount of profit by lowering the ratio of surplus produce to invested capital.

The proof of the theory that the rate of profit had to fall, given a rise in the price of wage goods, required a theory of exchange value. Since Ricardo's analysis denied that the circulation of commodities, *ex post* of production, had any effect upon aggregate profits, he had to relate his theory of profits to the exchange of commodities in the market. Ricardo developed his theory of value specifically in order to show that a rise in the price of all goods could not overcome the fall in the rate of profit that the rise in wages would induce. He had to show that value was actually a constant, determined in the process of production, not in the process of the circulation of commodities, and that, when general wages rose, general prices could not rise *pari passu*.

The connection between the labor theory of value and the rate of profit, in the Ricardian system, took the following form. Assume, to begin with, that the long run ratios of exchange between any number of commodities are dependent upon the ratios of the amount of labor time required in their production. Labor time, however, is not the only resource used in the process of production, and hence capital and land also must be considered as inputs. So far as Ricardo was concerned, the latter of these factors, land, was by nature heterogeneous. That is, any two land units chosen at random would not be of equal fertility, and hence land could not be used as a common denominator in which to express the relative ex-

change values of commodities. Also, since the accumulation of capital is unequal in time for different industries, with the result that there are varying amounts of fixed capital in the various sectors of the economy, capital is also heterogeneous and cannot be viewed as a common denominator of the value of the various commodities produced in the economy. This leaves labor as the best estimate of relative values.

Ricardo had no particular affinity for the working class and chose labor as the constant input factor of all commodities primarily because it best served the needs of his theoretical system. As the issue of a common denominator will be discussed later in this article, we may leave it, with the observation that the use of labor as a common denominator was only a first approximation to the question of relative value. Ricardo did not deny that the exchange ratio of various commodities was affected by variables other than the relative quantities of labor used in production. What he did deny, however, was that other factors were dominant in the long run. Thus, he held that if two commodities were produced with equal quantities of labor, but unequal proportions of capital, a change in the cost of labor (wages) would affect the relative prices of the two commodities in such a way that profits would change in the opposite direction from the change in wages. The first proposition was that if wages rose, profits would fall. The second was that if wages rose in two industries, say, but in industry A labor represented 60 percent of the input while in industry B only 40 percent, then the wage-profit effect would not be equal, since labor costs of A would be greater than the labor costs of B. But there was also a wage-price effect, since industry A would have to raise its price more than industry B (assuming competition) in order that the rate of return on investment in the two industries would remain equal (an assumption corollary to that of competition). This would mean that the price of the commodity produced in the industry with the most fixed capital

would increase less as a consequence of the rise in wages. An increase in wages would lower the relative price of commodities produced with high proportions of fixed capital. In summarizing his general theory of the effect of wage changes upon relative values, Ricardo claimed, "in proportion to the quantity and durability of fixed capital employed . . . the relative prices of those commodities . . . will vary inversely as wages; they will fall as wages rise and rise as wages fall." Wage changes *did affect* relative values, but still there was the "triumphant conclusion" that "no commodities are *raised in absolute* price, merely because wages rise." Since when wages rose there was no rise in absolute price, it was not true, as Malthus contended, that a rise in the cost of labor could be overcome in the market for commodities. The market for commodities was neutral so far as the ratio of wages to profits was concerned.

As Ricardo wrote in his "preface" to the first edition of the *Principles*, the major issue was "to determine the laws which *regulate*" the distribution of income. To find the regulator of the distribution of the economy's output, he turned to commodity production and the argument that the circulation of the economy's output played no active role in determining the size of the various income categories. These were determined prior to the transfer of commodities, and it was production which regulated the distribution of income among the recipients of wages, profits, and rents.

The formulation of a theory of value led Ricardo to the labor theory as an explanation of the general rate of profit. Income distribution and production were not independent of one another, or determined by diverse influences as John Stuart Mill later claimed, but were integrated in Ricardo's general schema by a theory of value that associated the relative worth of commodities with respective quantities of embodied labor. Value was regulated and determined in the process of production rather than by the simple supply and demand relationships by which Malthus and others explained

exchangeable value. Ricardo's value was an absolute value which, once derived in the process of production, regulated the distribution of income at the aggregate level. His theory was not intended as an explanation of particular market prices, nor of the ratios at which particular commodities would exchange, since his theory of exchange value was a general rather than a specific theory of price. He was interested, not in the problem of individual price, but in a theory of exchange value which would substantiate his theory of aggregate profit.

The idea that value was a constant rather than a variable was not explicitly stated in the *Principles*. Ricardo was forced to its explicit formulation only after Malthus published his *Measure of Value*, in 1823. In this work Malthus had persisted in his claim that profits were a function of the circulation of commodities, arguing that the permanent (rather than the temporary) conditions of demand and supply determined exchange value and profits. In order to refute this argument, Ricardo had to prove not only that exchange value was unaffected by circulation, but also that income distribution had no effect upon the "regulator" (embodied labor) of value. To do so, he finally turned to writing "Absolute Value and Exchangeable Value," the unfinished manuscript in which he differentiated between the *underlying* value of commodities as opposed to their relative or exchangeable value. This distinction was merely the logical conclusion of his principle that exchange value was a constant, unaffected by the circulation of commodities and unrelated to the changes in income distribution. It was a theory of value very similar to Marx's, in the first volume of *Capital*, and one that gave emphasis to "capitalist production," as against "capitalist circulation," as an explanation of profits.

III

Marx could not have been aware of Ricardo's final efforts at formulating the connection between the labor theory of

value, the general rate of profit, and the determination of exchange ratios under conditions of varying capital, since this material has only recently become available. Nor was Marx familiar with the extensive Ricardo-Malthus correspondence which dealt with these and related issues. What is interesting in this respect, however, is that Marx followed essentially the same pattern of working out the relationship of a theory of value dependent upon distribution theory with an explanation for prices which allows for varying degrees of capital formation in different industries, differences in time, and in rate of capital turnover. In one sense, this task amounted to an attempted integration of macroeconomics (aggregate distribution theory and the effects of capital formation), with microeconomics (the principles which determine prices at the individual firm level).

So far as Marx was concerned, the integration of these two problems of economic theory was dependent upon "transforming" the labor input value of commodities into their respective prices of commodities. The issue was crucial to Marx's schema for the same reason that the relation between absolute value and exchange value was crucial to Ricardo, for in both cases the success of such a theoretical relation determined whether the residual theory of profit was consistent with a theory of price.

Marx's own formulation of this theoretical issue has been the subject of a long controversy, having its origin with the Austrian economist, Böhm-Bawerk, who claimed that Marx's solution was conceptually in error and his formulation of the causes of profit (exploitation) inadequate. The controversy, at present writing, appears to have been resolved in favor of Marx's direction, in that while most authorities agree that the formulation of the problem in *Capital* is mathematically (logically) incorrect, they also agree that it is possible to construct an economic model in which the labor theory of value is set forth as a system of distribution but in which commodi-

ties do not exchange in proportion to the amount of labor used in their respective production. That is, it is possible to set forth an economic theory of individual price which is consistent with the classical formulation of the theory of value.

In one of his works Marx says:

To explain the *general nature of profits*, you must start from the theorem that, on an average, commodities are *sold at their real values*, and that *profits are derived from selling them at their values*. . . . If you cannot explain profit upon this supposition, you cannot explain it at all. (Italics in the original)

Thus, Marx attempted to solve the same problem with which Ricardo had struggled, namely, to develop a framework wherein profits were not determined in the market for commodities, but rather in the market for labor. Profits arise not because commodities exchange for more than their value, but they arise because they exchange in proportion to their value, when the latter is determined by relative quantities of labor. In both instances there is a residual between the value of total (labor) output and the wages paid to the producers. For Ricardo, the residual was a function of the law of population and the productivity of the land, while for Marx it was determined by institutional and historical factors which set the limits to the wage contract. Since capital accumulation under capitalism was responsible for a continuous displacement of labor (growth of the reserve army), the bargaining strength rested always with the entrepreneurial class, with the result that there was a continuous downward pressure upon wages.

The size of the residual, after wages have been determined, is subject to a large number of economic and social forces which Marx discusses in *Capital*, in much the same way as Ricardo had discussed them in his *Principles*. Primarily, Marx merely took Ricardo's assumptions to their logical ex-

tension. Still there was one distinct change (Engels called it Marx's major contribution), in that Marx made an explicit demarcation between the value of labor and the value of labor power. The difference, surplus value, accrued to the employer who, possessing capital, could expropriate the surplus by virtue of his buying labor power and selling its products at a price equal to the value labor created. Accordingly, prices were equal to value and value was the sole function of labor inputs, since there was but one scarce factor (labor), as the amount, durability, and rate of turnover of capital were the same in all industries (fixed capital coefficients). Total surplus depended upon the proportion of the labor force needed to produce subsistence for all workers (in Ricardo's case this was dependent upon land fertility), or as Marx put it, on the proportion of the average work day required for a worker to produce his own consumption, the balance being the amount of the working day used to produce the entrepreneur's income.

The limiting assumption of equal capital formation in all industries was dropped in Volume III of Marx's *Capital* in favor of the more realistic assumption that, historically, capital accumulation proceeds unevenly. The force of this historical conditioning was that a working day in Industry A would produce a larger output than in the case of Industry B, if in the former the worker had more capital equipment with which to perform. The ratio of labor to capital is, therefore, not constant as between industries. Also, the rate of turnover of capital would be different between industries, as some goods are held for longer inventory periods than others. Price would no longer be equal to value, or relative prices proportionate to relative quantities of labor, since price would also have to include an allowance for the composition and turn-over period of capital. The commodity "price of production," in some instances, was above and in some below the value input of labor, in accordance with the "organic

composition of capital." And it was here that Marx came to the same difficulty that had plagued Ricardo, namely, did the sale of commodities at their prices of production introduce a new source of profit into the system? Did the labor theory of value dominate the movement of prices, or did the movement of prices introduce an important, second source of profit? For Ricardo it was crucial since he disputed the contention that profits were determined by prices rather than the inverse of wages. For Marx it was also crucial because the uniqueness of the residual theory of profits was dependent upon the dominance of the determination of exchange values by the variables explained by the labor theory of value.

The intricacies of the "transformation problem" are rather complicated, even though the central core of the argument is quite simple and mathematically trivial. As already indicated, the issue is whether the commodity prices are deducible from the value ratios of the embodied labor, given different combinations of fixed and constant capitals. As Mr. Dobb has pointed out, what makes the problem more complex than first appears, is that not only must commodity prices (outputs) be stated in terms of prices of production; it is also necessary to express both labor power and capital (inputs) in terms of these prices, rather than their values. That is, the system of equations for a system such as Marx's will be such that both commodity markets and resource markets are expressed in terms of a common element: quantities of embodied labor (Volume I of *Capital*) or prices of production (Volume III of *Capital*).

It would extend the present discussion far beyond its limits if the details of the transformation process were to be outlined. Speaking of this conundrum of the labor theory of value, an Oxford economist recently remarked:

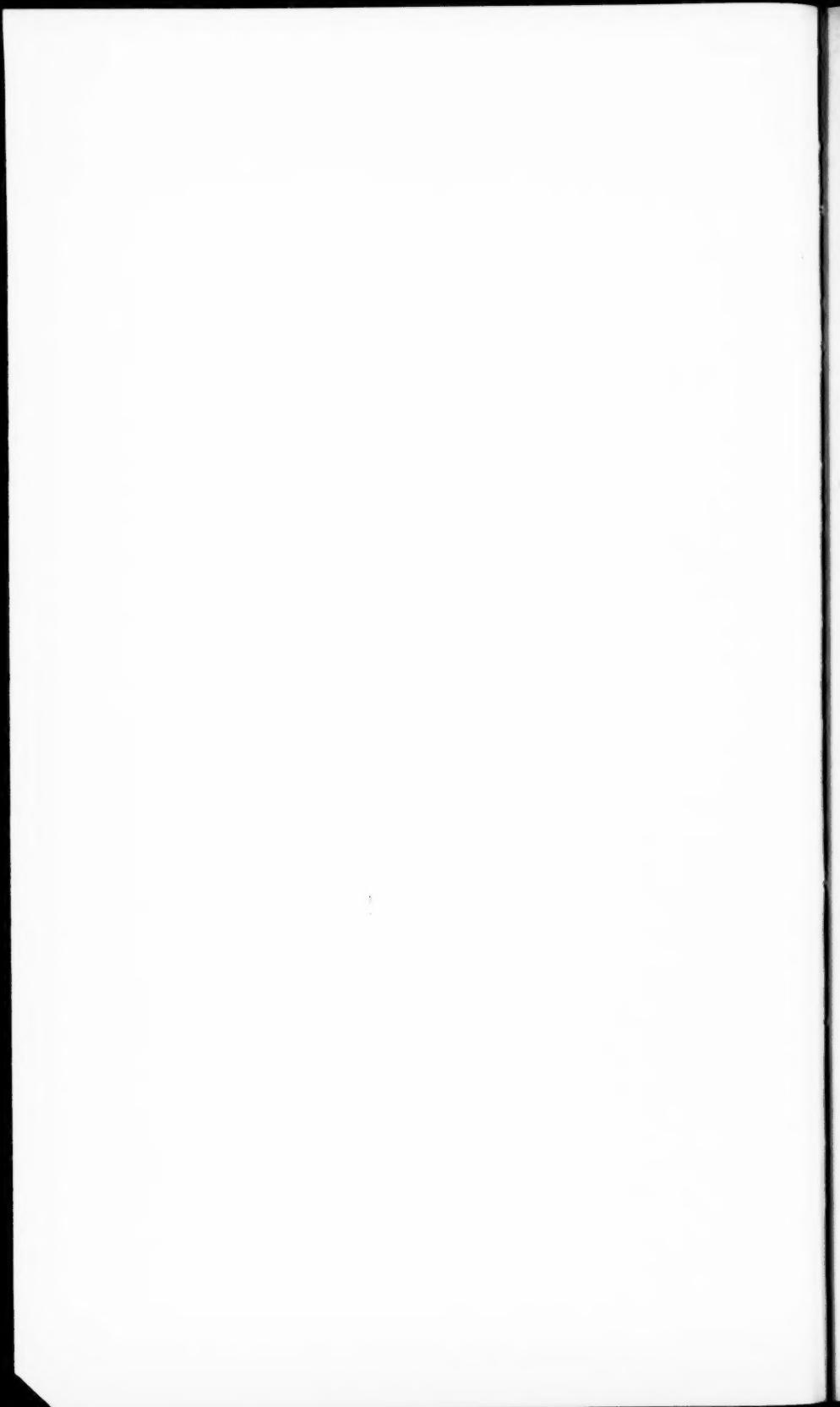
In concluding this article it is essential to enter an important *caveat*. While the internal consistency and determinacy of Marx's conception of the transformation process, and the

formal inferences he drew from it, have been fully vindicated by this analysis, the same can certainly not be said of the body of the underlying doctrine, without which the whole problem loses much of its substance and *raison d'être*. The assumption of equal "rates of exploitation" in all departments has never to my knowledge been justified. Neither has the notion that the "organic composition of capital" must needs be higher in the capital goods industries than elsewhere in the economy. Above all, the denial of productive factor contributions other than those of labour, on which the whole doctrine of the surplus rests, is an act of *fiat* rather than of genuine cognition. It is these doctrinal preconceptions which must remain the centre of any reappraisal of Marxian economics, rather than the logical superstructure which our analysis has shown to be sound enough."¹

The criticism of the labor theory of value has, accordingly, shifted. The long line of critical appraisals which stem from Böhm-Bawerk has had the effect of showing that "logically" the system is internally consistent. Now the issue is whether or not the system is operational. But, on this score, it should be observed that propositions built upon a utility theory of value also face the same operational test. And this leads further into the whole area as to whether an analytical system which leads to predication on some levels of abstraction is superior to one which yields fewer predicative results, even though neither system is itself subject to direct verification operationally. What remains, therefore, of the labor theory of value, as developed by Ricardo and Marx, is that it is highly respected as a system with which to deal with the issues of the effects of capital accumulation on the broad categories of income and employment (macroeconomics). The "messiness" of the labor theory of value when one is dealing with individual exchange ratios still remains, but as the Cambridge economist, Joan Robinson, recently suggested, despite these complications introduced by varying quantities of fixed

¹ F. Seton, "The 'Transformation Problem,'" *Review of Economic Studies*, June, 1957, p. 160.

and variable capital, "the labour theory of value . . . remains valid as a rough generalization, for differences in output per head are much greater, as between one line of production and another, than the differences due to these various qualifications."



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